Southern Inshore Fisheries and Conservation Authority

Pia Bateman – Chief Executive Officer

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24th January 2023

Dear Member,

MEETING OF THE TECHNICAL ADVISORY COMMITTEE – 2nd February 2023

A meeting of the Technical Advisory Committee will be held in the meeting room at Unit 3 on Thursday 2nd February 2023 at 14:00 to discuss the business on the under mentioned Agenda. Parking is limited, please consider other forms of transport, or share lifts. The nearby Holes Bay pub/restaurant allows parking if you partake of their refreshments and **ensure you enter your vehicle registration at the bar.** The Premier Inn also allow you to use their parking facilities, **please ensure you register your vehicle at their reception desk.** Poole railway station is approximately a 15-minute walk from the office.

Members of the public can request a guest telephone dial-in code from enquiries@southern-ifca.gov.uk.

Yours sincerely,

Sarah Birchenough
Deputy Chief Officer

AGENDA

1. Welcome
To welcome General Member Mr Colin Francis and Finance and Administration Manager Ms Liz Walker.

2. Apologies
To receive apologies for absence.

3. Declaration of Interest
All Members and Co-opted Members are to declare any interests in line with paragraphs (16) and (17) of the Southern IFCA Code of Conduct for Non-Council Members.

3. Minutes – 3rd November 2022
To confirm the Minutes of the Technical Advisory Committee meeting held on 3rd November 2022 (Marked A)

a. **Recommendation 159:** That DCO Birchenough review and amend the 2022 Solent Scallop Survey Report prior to submitting to the TAC Members via proxy, before the Report is made publicly available.

GUEST SPEAKER
Seafish Fisheries Management Plans – to receive a virtual presentation from Lewis Tattersall of Seafish, on the Crab, Lobster and Whelk Fisheries Management Plans for England.

PROGRESS REPORTS

4. To consider progress reports on matters outstanding:

a. **Chief Executive Officer Updates** – to receive a verbal update from the CEO.
b. **Deputy Chief Officer Updates** – to receive a verbal update from DCO Birchenough

ITEMS FOR DECISION

5. Poole Harbour Dredge Permit Byelaw Appropriate Assessment – to consider the report from DCO Birchenough (Marked B)

6. HRA – Studland to Portland SAC – Wrasse Fishery – to consider the report from PO Smith (Marked C)

ITEMS FOR INFORMATION

8. Coastal Futures – to receive a verbal update on the general themes of the 2023 Coastal Futures Conference from Member Mr. Neil Hornby.

9. Fisheries Industry Science Partnership Projects – to receive a report from DCO Birchenough (Marked D)

10. Live Wrasse Fishery Monitoring and Control Report 2022 – to receive a report from IFCO Condie (Marked E)

11. Date of Next Meeting

To confirm the date of the next meeting of the Technical Advisory Committee on the 4th May 2023 at Southern IFCA, Unit 3 Holes Bay Park, Sterte Avenue West, Poole Dorset BH15 2AA

Marked A

SOUTHERN INSHORE FISHERIES AND CONSERVATION AUTHORITY
TECHINICAL ADVISORY COMMITTEE – 3rd November 2022

Minutes of the Technical Advisory Committee held in the meeting room at the Southern IFCA office in Poole at **14:00 on 3rd November 2022**

Present

Dr Antony Jensen	(Chairman, MMO Appointee)
Mr Richard Stride	(Vice Chairman, MMO Appointee)
Mr Gary Wordsworth	(MMO Appointee)
Ms Louise MacCallum	(MMO Appointee)
Dr Simon Cripps	(MMO Appointee)
Mr James McClelland	(Natural England)
Mr Phil Rudd	(Environment Agency)
Ms Pia Bateman	Chief Executive Officer

Deputy Chief Officer (DCO) Mr Sam Dell and DCO Ms Sarah Birchenough, Business Service Manager (BSM) Mrs Sarah Harley, IFCO's Ms Emily Condie, Mr Dominic Parry and Ms Liberty Cast were also present.

Mr Neil Hornby (MMO Appointee), Mr Ted Legg (MMO Appointee) and Co-opted Members Mr Steve Matthews and Ms Elisabeth Bussey-Jones attended the meeting virtually.

Apologies

143. Apologies for absence were received from Ms Rachel Irish (MMO Appointee).

Declarations of interest

144. The following pecuniary interests were declared: Mr R Stride (5b), Mr G Wordsworth (6, 8 prejudicial and 11 prejudicial) and Mr S Matthews (9). The following non-pecuniary interests were declared: Mr P Rudd (6 and 7), Mr N Hornby (7 and11), Dr A Jensen (9 and 11), Mr T Leg (4 and 5c), Mr J McClelland (6,7,8 and 11).

Minutes

145. Members considered the Minutes of the meeting held on 25th August 2022 and these were confirmed and signed.

Channel Demersal Non-Quota Channel Fisheries Management Plan

146. Mr Nicholas French, a Principal Fisheries Manager working in the Fisheries Management Team with the MMO provided Members with a virtual presentation on the Channel Demersal Non-Quota Species Fisheries Management Plan (FMP). Mr N French discussed the development and delivery stages for the FMP, as well as detailing the species that will be included under the FMP. The presentation provided information regarding a working group which will continue to meet on a monthly basis until June 2023.

Mr N French invited Members to contact the MMO if they wish to find out more information via fmp@marinemangement.org.uk and https://www.gov.uk/guidance/channel-demersal-non-quota-species-fisheries-management-plan.

PROGRESS REPORTS

147. Chief Executive Officer Updates

The CEO provided a general update on the stages of each frontrunner FMP, discussing the importance of this area of work for the IFCAs during the planning stages of FMPs all the way

through to delivery. The CEO reminded Members that FMP updates are provided on the Southern IFCA website and social media channels, inviting Members to consider their participation in the current Bass FMP 'co-design' survey (link on website) closing on the 6th November 2022.

The CEO discussed the various stages that each FMP had reached, with the Crab & Lobster and Whelk FMPs (Seafish) currently drafting overarching and species-specific objectives, prior to embarking on stakeholder engagement events along the coast. The King Scallop FMP, led by an industry lead co-management group have developed high level aims and objectives which they are also about to present to stakeholders.

The CEO announced that Mr Colin Francis had been recently appointed by the MMO to Southern IFCA as a General Member, representing the Recreational Sea Angling (RSA) Sector. Subject to appropriate recruitment checks and following a planned induction, Mr C Francis would be joining the Membership in due course. The CEO discussed the intention for the MMO to undertake a nationwide Member recruitment campaign in January 2023, recognising the current General member vacancy at Southern IFCA.

The CEO updated Members on the progress of the Defra Conduct and Operations Report. As part of this process Defra have contracted the University of Portsmouth to engage with stakeholders across the District, in order to seek input on how the community feel that Southern IFCA have performed in the delivery of their legislative duties over the last four years. The CEO advised the General members that they would soon be receiving an 'expert questionnaire' from Defra in order to capture their views.

Resolved
148. That Member's noted the update.

149. Pot Fishing Byelaw
DCO Birchenough provided a status update on the Pot Fishing Byelaw, informing Members that the Executive Sub-Committee had now had the opportunity to consider the objections raised during the formal consultation in addition to the corresponding responses which had been drafted by Officers. These responses were informed by the outcomes of a TAC working group, subsequent to recommendations made by the TAC in August 2022. DCO Birchenough confirmed that the responses to the objections were disseminated following the meeting of the Executive Sub-Committee in September 2022.

DCO Birchenough confirmed that the Pot Fishing Byelaw had been submitted to the MMO for Quality Assurance (QA), with an anticipated date for the first iteration in the QA process to be received by the 14th December 2022.

Resolved
150. That Member's noted the update.

151. MCRS Review
DCO Birchenough provided an update following the first Working Group (WG) held as part of the MCRS Review, which was focussed on flat fish. Following this positive meeting, officers are now in the process of undertaking additional socio-economic evidence gathering in order to inform future working groups.

Resolved
152. That Member's noted the update.

ITEMS FOR DECISION

Shore Gathering Review

153. DCO Birchenough provided Members with an overview of a recent WG which was focussed on Shore Gathering. WG discussions culminated in the development of a series of Shore Gathering Policy Objectives, framed in the context of legislative drivers.

Mr Matthews discussed concerns regarding the transportation of pests such as tingle larvae, informing Members that they are difficult to detect and shore gatherers might not be able to recognise them. DCO Birchenough confirmed that within the Habitats Regulations Assessment (HRA) process, which is required to be undertaken for all activities which occur within National Site Networks, there is advice on operations, provided by Natural England, which indicate potential pressures, including those posed by a biosecurity risk. As such, this matter is considered when developing the HRA, in order to indicate what mitigation may be required. All Members gave mutual consent.

Resolved

154. That Members recommend to the Authority that:

- **a)** The Policy Objectives for the review, developed based on a position taken by the Authority Working Group, are used to frame the review through the subsequent stages.
- **b)** The Shore Gathering Review proceeds to Stage 2: Draft Measures, of the Byelaw Making Process.
- **c)** The Authority completes the required assessments for Shore Gathering activities within Designated Sites and Natural England are consulted on the outcomes of these assessments.
- **d)** Best-available evidence is collated and reviewed to assess the purpose and impact of existing shore gathering byelaws and other measures.
- **e)** As part of the evidence gathering process Officers develop a timeline for consultation and engagement with stakeholders
- **f)** A TAC working group is convened to review the outcomes from (3), (4) and (5) and use this as a basis to consider potential management options.

Wrasse Fishery Review

154. IFCO Condie provided Members with a report which considered the 2022 wrasse fishery data in the context of the corresponding Monitoring and Control Plan. Specifically, that one of the monitoring variable, which relates to the volume of wrasse caught, had exceeded its trigger value (25% of 2018 baseline) by 3%, equating to an additional c.1,200 fish being landed. IFCO Condie provided information on how the data is collected and the ongoing correspondence with operators in the fishery during the current season.

IFCO Condie informed Members that, in accordance with the Monitoring and Control Plan, when a trigger is reached, the Authority must undertake a review of the HRA, prior to consideration of further actions. All Members gave mutual consent.

Resolved

155. **a)** That Members review the evidence base for the wrasse fishery, including the 2022 data

b) That, in accordance with the Assessment Feedback Process outlined in Section 8 of the 'Studland to Portland Special Area of Conservation (SAC) Monitoring and Control Plan, Wrasse Fishing', Members agree to reassess the HRA for the fishery.

Mussel Fishery Authorisation

156. DCO Birchenough invited Members to consider an application for a continuation of authorisation to remove 1000 tonnes of seed mussels from an area east of Portland Bill for 2023.

DCO Birchenough explained to Members that the area covered by the authorisation lies outside the boundary of Studland to Portland SAC. This authorisation had last been approved by The Authority in February 2022 to cover the period until the 31st December 2022. Recently an application request had been received to continue this activity in 2023, with the Total Allowable Catch remaining at 1000 tonnes.

DCO Birchenough discussed that the Test of Likely Significant Effect (TLSE) had been reviewed in accordance with the Authority's legal duties, and that this had concluded that there would be no adverse effect from the fishing activity, subject to the conditions which have been placed on the authorisation previously being upheld. All Members gave mutual consent.

Resolved

157. **a)** That Members recommend, subject to formal consultation with Natural England, that the Authority shall provide written consent for the Fishing Vessel (F/V) WY37 Nicola L, to remove seed mussel until 31st December 2023, provided that:

- **i.** A total of no more than 1,000 tonnes of mussels are removed during this period;
- **ii.** Mussel fishing is restricted to the area contained by the co-ordinates:
  002° 24.402' W 50° 30.124' N,
  002° 24.402' W 50° 29.770' N,
  002° 21.908' W 50° 29.770' N,
  002° 21.912' W 50° 29.228' N, and
  002° 25.278' W 50° 29.705' N;
- **iii.** All mussels landed are relayed for a minimum of 6 months on a Several Fishery lay within Poole Harbour;
- **iv.** Whilst fishing for mussels the vessel is fitted with an operational VMS unit;
- **v.** The Southern IFCA Office is notified by telephone no less than 12 hours and during office hours (0900 – 1700) prior to daily mussel fishing operations; and
- **vi.** Based on provision of new evidence, the Authority retains the right to alter or suspend this permission.

ITEMS FOR INFORMATION

Outcomes of the Solent Scallop Survey 2022

158. Mr R Stride chaired the following item due to Dr A Jensen declaring an interest in the agenda item.

IFCO Cast provided Members with an overview of the outcomes following the recent Solent scallop survey (Autumn 2022). In addition, IFCO Cast provided an analysis of the timeseries of data gathered in Summer 2021, Spring 2022 and Autumn 2022.

Mr Matthews discussed his concerns with drawing conclusions from the data too quickly, given that the survey has only been repeated three times to date. He also raised a query on the sampling methodology, related to the length of time of the tow and suggested that the data might be improved by using an 8-minute tow rather than a 4-minute tow, as this would better capture the additional material obtained in dredges while fishing and may allow for the retention of smaller scallops. He raised a concern that the current methodology would not be able to provide an indication of the number of scallops in smaller size classes, i.e., those which are attaching to cultch which would give an indication of levels of spat fall.

DCO Birchenough thanked Mr Matthews for his observations and discussed the concerns raised regarding the survey methodology in the context of resourcing and data timeseries. Specifically, when considering an elongation of length of tow, there would likely be a reduction in the number of tows that could be achieved in a given timeframe. A change in methodology would mean that future results would not be comparable to those already obtained from the last three surveys.

Dr Jensen responded that maintaining a 4-minute tow would be useful for coverage and to allow comparability between data but that it would be interesting to get a feel for the spat settlement in the Solent. It was queried whether there would be any potential in the future for further survey work on this fishery to complement the stock data recognising the potential resource implications of this. Dr Jensen added that the classic way of looking at recruitment would be to do a slow tow using video systems across the seabed to measure the population in situ which would also potentially aid in removing the issue of catch bias caused by the dredge. Mr Stride discussed the length frequency distribution, in that the dredges used for sampling are size selective in order to maximise retention of individuals above the minimum size, therefore Mr Stride highlighted that the dataset obtained through the survey shouldn't be used to provide an indication of the length frequency of the whole population.

Members raised a number of concerns regarding the accuracy of the data within the report and some of the conclusions presented. Dr S Cripps suggested that the report needed to provide both a summary of the technical data, as well as conclusions that are clear and supported by the data, to enable those reading the report from a non-technical perspective, to understand the findings.

DCO Birchenough noted these points and committed to making the appropriate changes, prior to the updated report being submitted to the TAC Members by proxy for consideration. DCO Birchenough invited Members to send any further comments through via email for consideration when reviewing the report.

Recommendation
159. That DCO Birchenough review and amend the 2022 Solent Scallop Survey report prior to submitting to the TAC Members via proxy, before the Report is made publicly available.

Date and time of Next Meeting
160. That the meeting of the TAC will be on the 2nd February 2023 at Southern IFCA Offices, Unit 3, Holes Bay Park.

Exclusion of the Public
161. In accordance with the Local Government Act (1972), Members of the public accessing the meeting virtually left the meeting on the grounds that the following item of business involves the likely disclosure of exempt information as defined in Para 7 part 1 of the Schedule 12(A) of the Local Government Act (1972). There were no members of the public present in person at the meeting. In addition Mr Wordsworth left the meeting at 15:59, due to a pecuniary prejudicial interest in the agenda item.

Poole Harbour Several Order – Request to Amend Business Plan
162. DCO Birchenough asked Members to consider a confidential report giving details of a proposed change of methodology in the Business Plan for Lease Beds 6, 7, 8 & 10, which Southern IFCA manage under The Poole Harbour Fishery Order 2015. The proposed changes have been reviewed and the proposed changes to the Business Plan in the report are in line with the current Appropriate Assessment for the issuing of leases under The Order. All Members gave mutual consent.

Resolved
163.

- **a)** That Members approve the proposed changes to the Business Plan 2020-25 for Lease Beds 6, 7, 8 & 10.
- **b)** That Members approve the proposed minor amendment to the Lease associated with Lease Bed 6.
- **c)** That Members approve the proposed minor amendment to the Lease associated with Lease Bed 7.
- **d)** That Members approve the proposed minor amendment to the Lease associated with Lease Beds 8 & 10.

There being no further business the meeting closed at 16:10

Chairman: **Date:**

Southern Inshore Fisheries and Conservation Authority

Marked B

OFFICER'S REPORT

POOLE HARBOUR DREDGE PERMIT BYELAW
2023-24 DREDGE PERMIT AND HRA

Report by DCO Birchenough

A. Purpose of the Report

The purpose of this report is for Members to consider the Habitats Regulations Assessment under the Poole Harbour Dredge Permit Byelaw for the 2023-24 season.

B. Recommendation

1. That, based on the evidence provided in the Habitats Regulations Assessment, Members agree the issuing of 45 permits for the 2023-24 dredge season under the Poole Harbour Dredge Permit Byelaw.

2. That Members authorise Officers to make any amendments to the HRA as required following feedback from Natural England.

C. Annex

i. Poole Harbour Special Protection Area (SPA) Appropriate Assessment - Issue of Permits Under Poole Harbour Dredge Permit Byelaw (2023-24 Season)

1. Background

1.1 Under the Poole Harbour Dredge Permit byelaw, the Authority manages the use of dredges, principally for the fishing for shellfish, within Poole Harbour. Under this byelaw a restricted number of permits are issued each year by the Authority with accompanying conditions relating to catch restrictions and reporting, gear types, gear construction and restrictions, spatial and temporal restrictions and the fitting of specified equipment to vessels.

1.2 Duties under the Conservation of Habitats and Species Regulations 2017 and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 require Southern IFCA, as a competent authority, to make an appropriate assessment of a plan or project likely to have a significant effect on a site that is part of the National Site Network (either alone or in combination with other plans or projects). Sites under the National Site Network include Special Protection Areas (SPA) and Special Areas of Conservation (SAC) which were previously referred to as European Marine Sites.

1.3 Poole Harbour is designated as an SPA as well as a Site of Special Scientific Interest (SSSI) and Ramsar site. As per the Duties of the Southern IFCA, an appropriate assessment is undertaken for the issuing of permits under the Poole Harbour Dredge Permit byelaw. The purpose of the assessment is to determine, whether or not in the view of Southern IFCA, the issuing of permits will hinder the achievement of the conservation objectives of the Poole Harbour SPA and lead to an adverse effect on site integrity.

1.4 A review of research into shellfish dredging impacts identifies the permitted activity has the potential to impact features of the SPA through pressures including visual disturbance,

physical change (to another sediment type), removal of non-target species and removal of target species. These potential impacts and risks to the integrity of the site are however mitigated through a number of conditions applied under the permit. These include the exclusion of shellfish dredging all year round in a number of key sites which represent important areas for feeding and roosting and important areas of supporting habitat (saltmarsh), prohibition of shellfish dredging during key sensitive times (1st November-23rd December & 25th May-30th June) in a series of sites also important for feeding and roosting, the timing of the closed season (23rd December to 24th May) which largely corresponds to the overwintering period for designated bird species, a cap on fishing effort through the allocation of a set number of permits, a number of restrictions on gear configuration and a requirement for catch reporting. Additional mitigation is also afforded through the Southern IFCA 'Poole Harbour Saltmarsh Protection Code of Practice' which sets out guidelines to avoidance disturbance to breeding and roosting birds and promotes the protection of supporting habitat.

1.5 There has not been a need for a review of permit conditions since the conclusion of the 2022/23 dredge season and therefore there have not been any changes made to the permit conditions or any other management measures for the fishery for the 2023/24 season. As there have been no changes to the permit or any other management measures for the fishery, the HRA remains largely the same as for the previous year (2022/23). Catch and effort data for the fishery from the previous season (2022/23) has been incorporated into the assessment as well as results from the 2022 Poole Bivalve Stock Assessment and any required updates have been made to information provided for the site such as the SSSI Condition Assessment.

1.6 Based on the mitigation measures, in the form of permit conditions and the additional code of practice, it is concluded that that issuing of permits for the 2023/24 season under the Poole Harbour Dredge Permit Byelaw will not hinder the site from achieving its conservation objectives, either alone or in combination, and as such will not have an adverse effect upon on the integrity of the Poole Harbour SPA and Ramsar site.

1.7 Based on the outcome of the HRA, it is therefore proposed that the number of permits issued for the 2023/24 season should remain at 45 (the same as for the previous seasons 2015/16, 2016/17, 2017/18, 2018/19, 2019/20, 2020/21, 2021/22, 2022/23).

1.8 The HRA has been sent to Natural England for Formal Advice. Natural England supported the conclusions of the HRA for the 2022/23 season based on the evidence provided, however identified some uncertainties in relation to the long-term recovery of littoral sediments. Southern IFCA have continued to engage with Natural England on this matter but to date there is no new evidence available, therefore the assessment and associated outcomes have been drafted on the basis of the current best available evidence.

1.9 Members are asked to consider the conclusion of the Habitats Regulations Assessment and agree that 45 permits can be issued for the 2023/24 season with Officers authorised to make any amendments to the HRA as required following any feedback from Natural England.

LOCAL GOVERNMENT (ACCESS TO INFORMATION) ACT 1985
List of Background Papers

- Poole Harbour Dredge Permit byelaw
  http://www.southern-ifca.gov.uk/byelaws#PooleHarDredge

Document Control

Title	**Poole Harbour Special Protection Area (SPA) Appropriate Assessment - Issue of Permits Under Poole Harbour Dredge Permit Byelaw (2023-24 Season)**
SIFCA Reference	SIFCA/HRA_PP/PHDPByelaw202324
Author	S Birchenough
Approver	
Owner	Southern IFCA
Template Used	HRA Template Plan/Project v1.0

Revision History

Date	Author	Version	Status	Reason	Approver(s)
23/01/2022	S Birchenough	1.1	Initial Draft		P Bateman

This document has been distributed for information and comment to:

Organisation	Name	Date sent	Comments received

Southern Inshore Fisheries and Conservation Authority (IFCA)

Habitat Regulations Assessment for Plans/Projects

European Marine Site: Poole Harbour SPA

Plan/Project: Issue of permits under Poole Harbour Dredge Permit byelaw for 2023-24 season

Feature(s): Common tern, Sandwich tern, Mediterranean gull, Little egret, Spoonbill, Avocet, Shelduck, Black-tailed godwit (Icelandic Race), Water bird assemblage (Dunlin, Dark-bellied Brent goose, Teal, Goldeneye, Red-breasted merganser, Curlew, Spotted redshank, Greenshank, Redshank, Pochard, Black-headed gull)

Site Specific Sub-feature(s)/Supporting Habitat(s): Coastal lagoons, Freshwater and coastal grazing marsh, Mediterranean and thermo-Atlantic halophilous scrubs, Atlantic salt meadows, Spartina swards, Intertidal seagrass beds, Intertidal mixed sediments, Intertidal mud, Intertidal sand and muddy sand, Water column

1 Technical Summary

Duties under Regulation 9 of the Conservation of Habitats and Species Regulations 2017 and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 require Southern IFCA, as a competent authority, to make an appropriate assessment of a plan or project likely to have a significant effect on a site that is part of the National Site Network (either alone or in combination with other plans or projects). As such, Southern IFCA undertakes an annual appropriate assessment for the issue of permits under the Poole Harbour Dredge Permit byelaw which regulates dredge fishing within the Poole Harbour Special Protection Area (SPA). The byelaw regulates the wild shellfish fishery in the Harbour through the annual allocation of a fixed number of permit entitlements (45). The permit allows the use of, retention on board, storage and transportation of a dredge within Poole Harbour and under each permit a number of conditions are applied. The purpose of the assessment is to determine, whether or not in the view of Southern IFCA, the issuing of permits will hinder the achievement of the conservation objectives of the Poole Harbour SPA and lead to an adverse effect on site integrity.

A review of research into shellfish dredging impacts identifies the permitted activity has the potential to disturb bird populations and lead to changes in prey availability. These potential impacts and risks to the integrity of the site are however mitigated through a number of conditions applied under the permit. These include the exclusion of shellfish dredging all year round in a number of key sites which represent important areas for feeding and roosting, prohibition of shellfish dredging during key sensitive times (1st November-23rd December & 25th May-30th June) in a series of areas also important for feeding and roosting, the timing of the closed season (24th December to 24th May) which largely corresponds to the overwintering period, a cap on fishing effort through the allocation of a set number of permits and a number of restrictions on gear configuration. Additional mitigation is afforded to saltmarsh habitats, which are a supporting habitat for the features of the SPA, through four areas where shellfish dredging is prohibited all year round, three at Seagull Island and one at Green Island, and through the Southern IFCA ‘Poole Harbour Saltmarsh Protection Code of Practice’ which sets out guidelines to avoid disturbance to nesting and roosting birds and promote the protection of supporting breeding habitat.

Based on these mitigation measures, in the form of permit conditions and additional protection from the Code of Practice, it was concluded that that issuing of permits for the 2023/24 season under the Poole Harbour Dredge Permit Byelaw will not hinder the site from achieving its conservation objectives and as such will not have an adverse effect upon on the integrity of the Poole Harbour SPA and Ramsar site. As in previous years (2015/16, 2016/17, 2017/18, 2018/19, 2019/20, 2020/21, 2021/22, 2022/23) it is therefore proposed the number of permits issued should remain at 45.

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2 Introduction

2.1 Need for a Habitats Regulations Assessment (HRA)

The National Site Network[1] is a network of protected sites which are designated for rare and threatened species and rare natural habitat types. These sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA), designated under the EC Habitats Directive 1992 and EC Birds Directive 2009 (amended), respectively. The Conservation of Habitats and Species Regulations 2017[2], as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[3], transposes the land and marine aspects of the Habitats Directive and the Wild Birds Directive into domestic law, and outlines how the National Site Network will be managed and reflect any changes required by EU Exit.

Southern IFCA has duties under Regulation 9 of the Conservation of Habitats and Species Regulations 2017 as a competent authority, with functions relevant to marine conservation, to exercise those functions so as to secure compliance with the Habitats Directive and Birds Directives.

Article 6(3) of the Habitats Directive requires any plan or project likely to have a significant effect on a European site (SPA or SAC) within the National Site Network, either individually or in combination with other plans or projects, to undergo an Appropriate Assessment to determine its implications for the site.

Article 4(4) of the Birds Directive states that 'Member states shall take appropriate steps to avoid …deterioration of habitats or any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article'.

Regulation 63 of the Conservation of Habitats and Species Regulations 2017 requires Southern IFCA, as the competent authority, to make an appropriate assessment of a plan or project which is likely to have a significant effect on a European site that forms part of the National Site Network (either alone or in combination with other plans or projects) and is not directly connected with or necessary to the management of the site in question. The implications of any plan or project must be assessed in view of the site's conservation objectives.

This document forms the basis of an appropriate assessment for the issue of permits under the Poole Harbour Dredge Permit byelaw for the 2023/24 season. The purpose of this document is to assess whether or not in the view of Southern IFCA, the issue of permits under the Poole Harbour Dredge Permit byelaw will have a likely significant effect on the bird features and supporting habitats (saltmarsh and intertidal sediment) of the Poole Harbour SPA alone, and in combination with other plans or projects. The assessment ensures Southern IFCA meets its responsibilities as a competent authority by ensuring that the conservation objectives of the Poole Harbour SPA will be met and the integrity of the site is not adversely affected.

[1] The National Site Network is the network of sites in the United Kingdom's territory consisting of such sites as immediately before EU Exit day formed part of the Natura 2000 site network.
[2] The Conservation of Habitats and Species Regulations 2017 (legislation.gov.uk)
[3] The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (legislation.gov.uk)

2.2 Documents reviewed to inform this assessment

- Reference list[4] (Annex 1)
- Natural England's Conservation Advice[5]
- Site map(s) – sub-feature/feature location and extent (Annex 2)
- Fishing activity data (map(s), etc) (Annex 3)
- Natural England's advice on the potential impacts of shellfish dredging on the nature conservation features of Poole Harbour SPA, Ramsar and SSSI (received 3rd June 2014) (Annex 4)
- Fisheries Impact Evidence Database (FIED)/SPA Tool Kit

3 Information about the Special Protection Area

- Poole Harbour SPA (Site Code: UK9010111)

3.1 Overview and qualifying features

The site qualifies under **Article 4** of the Birds Directive (2009/147/EC) for the following reasons (summarised in Table 1):

- The site regularly supports more than 1% of the Great Britain populations of five species listed in Annex I of the EC Birds Directive.

- The site regularly supports more than 1% of the biogeographic population of two regularly occurring migratory species not listed in Annex I of the EC Birds Directive.

Feature		**Interest Type**
A193	Common tern *Sterna hirundo*	Annex 1 Breeding
A191	Sandwich tern *Sterna sandvicensis*	Annex 1 Breeding
A176	Mediterranean gull *Larus melanocephalus*	Annex 1 Breeding
A026	Little egret *Egretta garzetta*	Annex 1 Non-breeding
A034	Spoonbill *Platalea leucorodia*	Annex 1 Non-breeding
A132	Avocet *Recurvirostra avosetta*	Annex 1 Non-breeding
A048	Shelduck *Tadorna tadorna*	Regularly occurring migrant Non-breeding
A156	Black-tailed godwit, Icelandic-race *Limosa limosa islandica*	Regularly occurring migrant Non-breeding

[4] Reference list will include literature cited in the assessment (peer, grey and site specific evidence e.g. research, data on natural disturbance/energy levels etc)

[5] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9010111&SiteName=Poole%20harbour&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

- The site qualifies under **Article 4** of the Birds Directive (2009/147/EC) as it used regularly by over 20,000 waterfowl (waterfowl as defined by the Ramsar Convention) or 20,000 seabirds in any season.

  During the non-breeding season the area supports 25,176 individual waders and waterfowl including (in addition to the species which qualify as features in their own right (Table 1)): dunlin (*Calidris alpine)*, great cormorant (*Phalacracorax carbo)*, dark-bellied Brent goose (*Branta bernicla bernicla)*, teal (*Anas crecca),* goldeneye (*Bucephala clangula)*, red-breasted merganser (*Mergus serrator)*, curlew (*Numenius arquata),* spotted redshank (*Tringa erythropus)*, greenshank (*Tringa nebularia)*, redshank (*Tringa tetanus)*, pochard (*Aythya farina)* and black-headed gull (*Chroicocephalus ridibundus),* all of which are present in nationally important numbers. The features; little egret, spoonbill, black-tailed godwit and shelduck are also included within the water bird assemblage.

3.1.1 Supporting Habitat

Natural England's Advice on operations[6] details the supporting habitats as follows. No breakdown of supporting habitats is given per qualifying species.

- Coastal lagoons
- Freshwater and coastal grazing marsh
- Mediterranean and thermo-Atlantic halophilous scrubs
- Atlantic salt meadows
- Spartina swards
- Intertidal seagrass beds
- Intertidal mixed sediments
- Intertidal mud
- Intertidal sand and muddy sand
- Water column

Poole Harbour is a bar-built estuary of nearly 4,000 ha located on the coast of Dorset in southern England. The Harbour occupies a shallow depression towards the south-western extremity of the Hampshire Basin which has flooded over the last 5,000 years as a result of rising sea levels. The unusual micro-tidal regime means that a significant body of water is retained throughout the tidal cycle. The Harbour therefore exhibits many of the characteristics of a lagoon. There are extensive intertidal mudflats and, away from the north shore that has become urbanised through the growth of the town of Poole, there are fringes of saltmarsh and reedbed. The Harbour supports important numbers of water birds in winter and is also an important breeding site for terns and gulls, whilst significant numbers of Little Egret *Egretta garzetta* and Aquatic Warbler *Acrocephalus paludicola* occur on passage. Several river valleys converge on the Harbour, notably the Frome and the Piddle, and these support grazing marshes that contribute to the importance of the SPA for wintering waterbirds. Parts of the Harbour, especially along the western and southern shores, adjoin the Dorset Heathlands SPA. Where the two areas meet, there are unusual transitions from saltmarsh and reedbed to valley mire and heath habitats. The Harbour is separated from Poole Bay by the Studland Dunes (part of the Dorset Heaths [Purbeck and Wareham] and Studland Dunes SAC) and the SPA includes Littlesea, a large oligotrophic dune-slack lake of importance for wintering wildfowl.

In 2016 Natural England held a consultation on a proposed extension to the Poole Harbour SPA to include all areas below the Mean Low Water mark which lie within the Harbour entrance, an

6 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9010111&SiteName=Poole+harbour&SiteNameDisplay=Poole+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

additional landward extension in Lytchett Bay and the addition of three qualifying species: Sandwich tern, spoonbill and little egret. The rationale between the extension was to ensure that all areas of marine habitat which are exploited for resting, roosting or feeding by protected bird species were included. Poole Harbour regularly supports more than 1% of each of the populations of the three additional species. The proposed extension became a potential SPA (pSPA) on 21st January and as such the features and species proposed for inclusion were considered as part of the 2017/18 appropriate assessment. On 30th November 2017, the pSPA was included in the Register of European Sites in England (as required as Regulation 17 of The Conservation of Habitats and Species Regulations 2010) and as such was confirmed as part of the Poole Harbour SPA.

The full site citation is available at:
http://publications.naturalengland.org.uk/publication/6625771074355200

3.2 Conservation Objectives

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

The high-level conservation objectives for the Poole Harbour SPA are available online at: http://publications.naturalengland.org.uk/publication/6625771074355200

3.3 Ramsar Site

Poole Harbour is a Ramsar site, and as such is recognised as a wetland of international importance designated under the Ramsar Convention. The site was designated for the following reasons:

- Regularly supports 20,000 waterfowl
- Regularly supports over 1% of avocet, black-tailed godwit, common tern, Mediterranean gull and shelduck
- Supports an appreciable assemblage of rare, vulnerable or endangered species including a nationally scarce hydroid species *Hartlaubella gelatinosa* and nationally rare sponge *Suberites massa*
- Is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna including supporting the nationally scarce plants narrow leaved eelgrass *Zostera augustifolia* and dwarf eelgrass *Zostera noltii*

3.4 Site of Special Scientific Interest (SSSI)

Section 28G of the Wildlife and Countryside Act 1981 (as amended) defines 'section 28G authorities', including the Southern IFCA, who have a duty to take reasonable steps, consistent with the proper exercise of their functions, to further the conservation and enhancement of the flora, fauna or geological or physiological features by reason of which the site is of special scientific interest.

In May 2018 Natural England notified additional land as a part of the Poole Harbour SSSI. The largest of which includes the estuarial open water below mean water. The other three areas comprise saltmarsh, wetland and supporting habitats around the fringes of Lytchett Bay and Holes Bay respectively. All four additional areas have been included as they support estuarine habitats and/or wintering wildfowl and waders for which the site is designated. The area below MLW is also seen to support other features for which the site is designated including foraging habitat for breeding seabirds and subtidal benthic habitats.

In order to ensure the protection of the entirety of the re notified SSSI Southern IFCA worked with Natural England to produce and agree a 'Site Management Statement' for the Poole Harbour SSSI. This importantly includes the ongoing management of Wild Fishing Activity of which clam dredging is a part. In the site management statement, it was agreed that the current process of reviewing the Poole Harbour Dredge Permit Byelaw HRA in consultation with Natural England will ensure that the fishery does not damage or disturb the features of the site.

4 Plan/Project Description

The Poole Harbour Dredge Permit (PHDP) byelaw[7] regulates the wild shellfish fishery in Poole Harbour through the annual allocation of permit entitlements and as such requires an annual HRA for the issuing of permits.

4.1 Poole Harbour Dredge Permit

The permit allows the use of, retention on board, storage and transportation of a dredge within Poole Harbour.

Under the permit, a series of conditions are applied, relating to catch restrictions and reporting; gear types; gear construction and restrictions and spatial and temporal restrictions (see Annex 5 (Map) and Annex 6 (Permit Conditions)). The permit also allows for a requirement to fit specified equipment to vessels.

The permit is flexible and allows Southern IFCA to review the suitability of the permit conditions, attach conditions to the permit and vary or revoke conditions attached to the permit at any time after the permits have been issued, following a set process. As such, any changes will have regard to the Authority's duties and obligations under section 153 and 154 of the Marine and Coastal Access Act 2009, advice from Natural England, new evidence in the form of scientific data or literature and/or any Habitats Regulations Assessment. This flexibility allows proportionate management of the dredge fishery in Poole Harbour whilst achieving the conservation objectives of the site.

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

As in previous years (2015/16, 2016/17, 2017/18, 2018/19, 2019/20, 2020/21, 2021/22, 2022/23) it is proposed there will be a maximum of 45 permit entitlements. This reflects the current level of effort which is considered to be sustainable.

4.1.1 Permit Conditions

The spatial and temporal restrictions (Annex 5 & 6), which are part of the permit conditions, are designed to mitigate any potential impacts of dredge fishing activity on the nature conservation features of the Poole Harbour SPA and ensures there will be no adverse effect on site integrity. They reflect advice received from Natural England received prior to the introduction of the PHDP byelaw (June 2014) and an ongoing assessment of evidence relating to the marine environment in Poole Harbour and fishing activity under the Poole Harbour Dredge Permit Byelaw. The permit conditions:

Provide a network of areas where there is little or no noise and visual disturbance and sediment disturbance, including in the following specific areas:

- bird sensitive areas, areas where declines in some bird species have been observed (Brands Bay, Wych Lake, Lytchett Bay) that are likely to be in part attributable to site specific pressures
- Mediterranean gull nesting sites at Seagull Island
- areas where sediment recovery is likely to be slow (low energy sites)
- fringing saltmarsh, reedbed and lowland water habitats that support breeding birds

This is reflected in the permit conditions through the following measures:

- Shellfish dredging is excluded in Bird Sensitive Areas in Lytchett Bay, Holes Bay, and the inner regions Wych Lake and Middlebere Lake all year round.
- Shellfish dredging is excluded in sensitive saltmarsh habitat areas at Seagull Island and Green Island all year round.
- Shellfish dredging is excluded from overwintering, feeding and roosting bird sensitive areas at Wych Lake, Middlebere Lake, Newton Bay, Ower Bay, Keysworth Bay and parts of Arne Bay and Brands Bay (Annex 5) during key sensitive times of the year for bird species between 25th May and 1st July, 1st November and 23rd December.

Exclude or manage intensity where high levels of sediment disturbance could result in release of contaminants

- The area of Holes Bay is noted to pose a risk to release of contaminants

This is reflected in the permit conditions through the following measures:

- Shellfish dredging is excluded in Holes Bay all year round

Manage shellfish dredging throughout the Harbour in a way that minimises its impact on prey availability and disturbance

This is reflected in the permit conditions and Byelaw through the following measures:

- Restrictions in the number of permits (45)
- The design of the pump and dredge used
- Restrictions in the timing of when the fishery takes place (closed from 24th December to 24th May). The prohibition on dredge fishing activity from 24th December to 24th May mitigates over-wintering bird disturbance during this lean period.

Provide an ability to monitor catch levels, particularly for the main commercial species (Manila clam and common cockle) that are also prey species for some of the designated bird species.

This is reflected in the permit conditions and Byelaw through the following measures:

- There is requirement for fishers to provide monthly catch return data indicating, for each day of the month, the hours fished, the quantities of shellfish taken, the buyer(s) and the zone of the Harbour from which the catch was taken. This data allows the Southern IFCA to monitor trends in fishing activity and relate catch data to the data from the Poole Harbour Bivalve Stock Assessment[8] to ensure that fishing activity continues to remain sustainable with respect to shellfish stocks.

4.1.2 Changes to Permit Conditions

There have been no changes to permit conditions since the end of the 2022 fishing season. The last review of permit conditions took place following the end of the 2021/22 season, this review was underpinned by a need to consider a long-term management solution for the protection of saltmarsh habitat at Green Island and the wider harbour as well as considering the cost implication for the re-certification of the dredge fishery under the Marine Stewardship Council (MSC) Certification. The details of this review and associated outcomes are provided in the 2021/22 Appropriate Assessment for this fishery (https://secure.toolkitfiles.co.uk/clients/25364/sitedata/Redesign/Poole-Dredge-Permit-Fisheries/HRA-PHDPByelaw-2022-23.pdf). The changes to management which resulted from this review are incorporated into this Appropriate Assessment as they were for the 2022/23 Appropriate Assessment.

4.1.3 Additional work in the Permit fishery

During the 2021/22 fishing season, additional work was carried out in the fishery through 'The Poole Clam and Cockle Fishery Partnership Project' a project funded by the Marine Stewardship Council's Ocean Stewardship Fund which ran from March 2021 to February 2022. The project centred around progressing the condition placed on the fishery by the Marine Stewardship Council (MSC) certification relating to the management of the fisheries with regard to Endangered, Threatened and Protected (ETP) species. Progress had been made in this regard within the fishery following the initial Certification, and the Poole Harbour Clam and Cockle Fishery Group (consisting of the Poole and District Fishermen's Association, the Southern IFCA and Dorset Wildlife Trust) saw that there were shared benefits in continuing the partnership in order to address the condition and improve 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 so that the benefits of co-management and MSC certification can be replicated and enjoyed by 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

[8] Reports for the Poole Bivalve Stock Assessment can be found on the Southern IFCA website at https://www.southern-ifca.gov.uk/poole-harbour-fisheries. Note that there was no stock assessment carried out in 2020 due to the COVID-19 pandemic.

As part of the project the following outputs were produced:

4.1.3.1 Educational materials

Permit fishers were provided with an updated guide to the most common ETP species (Figure 3) with a link to the Southern IFCA website where more detailed information is provided on these and other ETP species that are found within the Harbour and wider area (https://www.southern-ifca.gov.uk/etp-species). Similar information was also placed on two interpretation boards which were installed at Fisherman's Dock and Rockley Marina.

Figure 3. Waterproof guide to ETP species provided to fishers in the Poole Harbour Dredge Permit Fishery their permit pack.

4.1.3.2 Observer Program

An observer program was carried out between July and October 2021. On-board observations were carried out for 18 permitted vessels over 19 fishing trips in Poole Harbour between July and October 2021. The observer worked covered a total of 37 hours of fishing activity and 424 dredge hauls as follows:

- A 3-4 hour period of observation was caried out for each vessel
- The hauling of the dredge was photographed on each occasion at the point where the dredge reached the sorting riddle
- From this point the haul was continually observed for the presence of ETP species until the dredge was returned to the sea
- Each image was given a GPS coordinate

The locations where dredge hauls were observed are shown in Figure 4. The results showed that there was no gear interaction with ETP species for any of the observer trips, representing 42% of the active fishery participants.

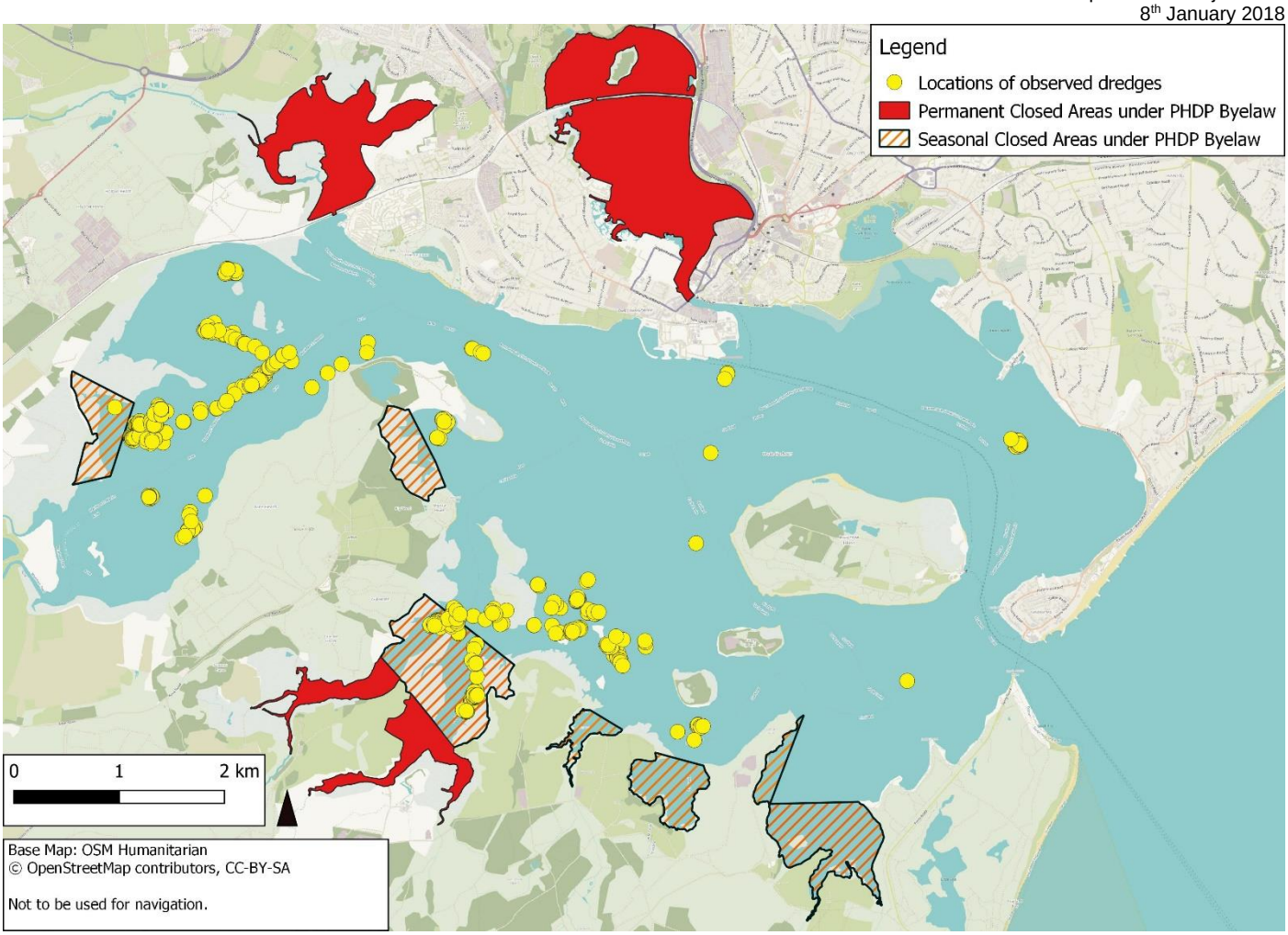

Figure 4. Locations where hauls were observed for permitted fishing vessels in the Poole Harbour Dredge Permit fishery as part of the observer program. Also shown are permanent and seasonal closed areas under the permit conditions.

4.1.3.3 Fishing Gear

Over the last two years, innovations have been made to fishing gear in the Poole Harbour dredge fishery which have added benefits in helping to mitigate potential impacts to ETP species. These innovations fall under three categories; developments to engines and water pumps, developments to fuelling mechanisms, developments to dredges and sorting equipment. Examples are shown in Figure 5.

i) 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. 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. In addition, the newer catamaran style vessels and some of the dory style vessels run the water pump using the inboard diesel engine 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.

ii) 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. 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).

iii) Developments to dredges and sorting equipment

Innovations in the fishery have 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. 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. 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 innovations 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. 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.

4.1.3.4 Risk Management Strategy

As part of the project a Risk Management Strategy was produced to outline how ETP species management can be approached in an adaptive manner which incorporates significant stakeholder involvement and elements of co-management through the promotion of fishery-dependent data collection. The Strategy presents the outcomes of the Poole Partnership Project and provides a process to follow for management development which aims to be applicable to other fisheries, particularly in the small-scale (<10m) inshore sector where fishing activity overlaps with conservation features. The 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 the Marine Stewardship Council Certification. The Risk Management Strategy can be viewed on the Southern IFCA website (ETP Species : Southern IFCA (southern-ifca.gov.uk)).

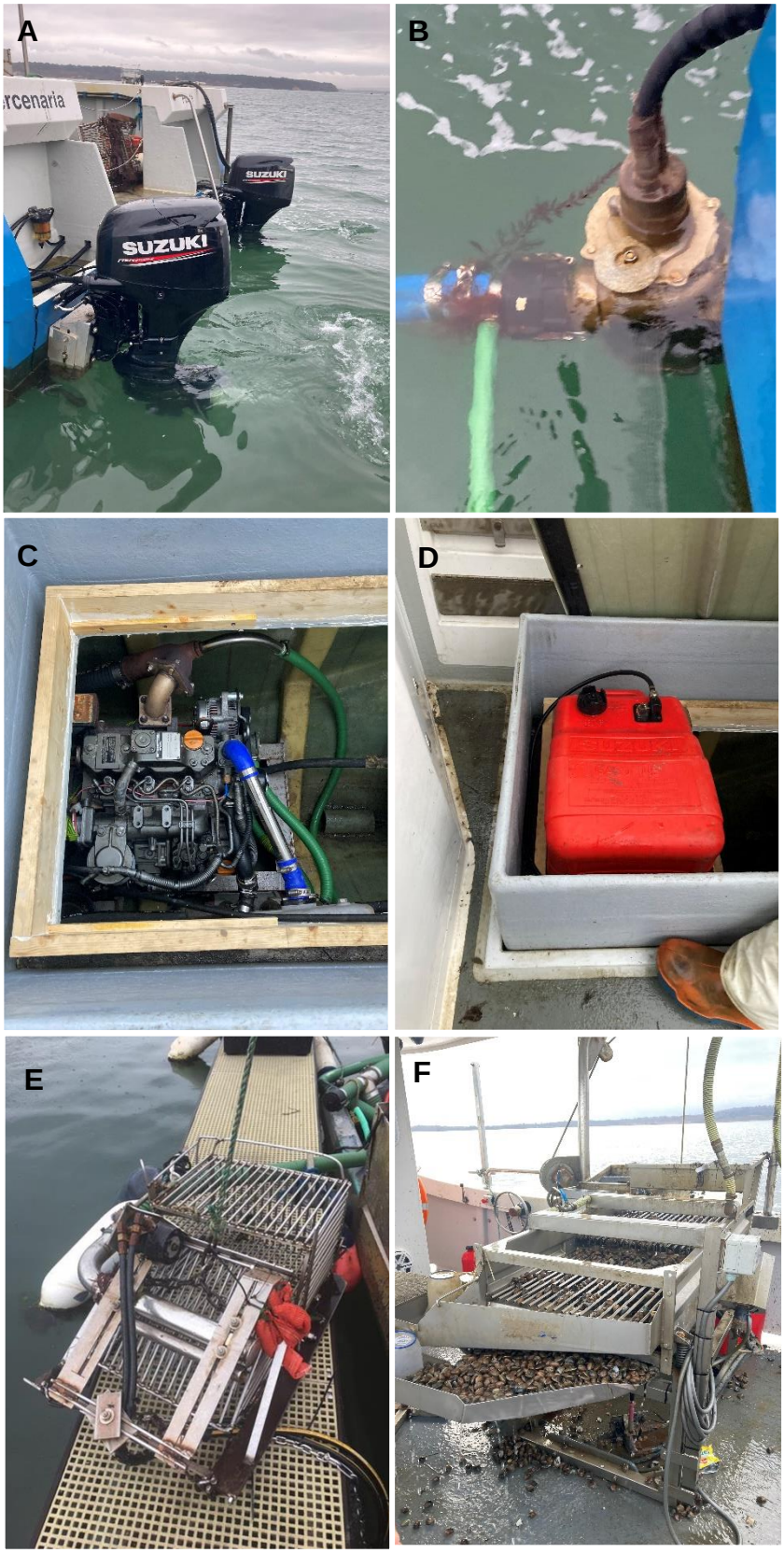

Figure 5. Examples of fishing gear innovations in the Poole Harbour dredge fishery; A) use of a single engine on tick-over during fishing, b) water cooled water pump, c) use of vessel's inboard engine to power water-pump, d) inboard fuel supply for dredge hydraulics and water pump, e) vibrating pump-scoop dredge and f) mechanised riddle table.

4.1.4 Poole Harbour Dredge Permit Access Policy

The Access Policy[9] outlines the way in which the Authority administers the allocation of permits under the byelaw and sets out criteria for applicants based on whether they have held a permit during the previous season or are a new entrant. In either case, the vessel for which an application is made must be a relevant fishing vessel as defined in the byelaw and the applicant must be a majority shareholder in that vessel or nominated for that purpose by a majority shareholder of the vessel provided that the applicant is also named as a shareholder on the vessel's certificate of registry.

This ensures that in order to gain a permit there is a rigorous process and set of criteria which will be tested by the Authority. The specified criteria are designed to ensure that permit entitlements are used during the season and that the fishery is open to those with a genuine desire to engage in the commercial shellfish fisheries within the Harbour. The process also prohibits unregistered/unlicensed fishing and creates a robust regulatory mechanism against illegal activity. The current version of the Access Policy was adopted by the Authority at their meeting on 21st March 2019.

4.2 Technical Gear Specifications

Fishing for shellfish in Poole Harbour is carried out using pump-scoop dredge. A pump-scoop dredge consists of toothed dredge basket which is towed through the seabed alongside a vessel (Jensen *et al*., 2005). Attached to the front end of the dredge is a series of water jets which direct a flow of water to the rear of the dredge basket (Jensen *et al*., 2005) (Figure 6). The water jets, powered by a hydraulic pump, allow sediment to be moved through the dredge basket (Jensen *et al*., 2005). In 2012, the use of a trailed pump-scoop dredge, which uses the aid of a davit arm and winch, was introduced. This type of dredge evolved from the previously used and more physically demanding hand-held dredge or scoop, pushed into the sediment and pulled along by a vessel (Jensen *et al*., 2005; Clarke *et al*., 2018). The pump-scoop dredge is deployed from small (less than 10 metre in length) and shallow drafted vessels. This gear type is unique to Poole Harbour and differs from suction or hydraulic dredging techniques which both fluidise the sediment by spraying water in front of the dredge (Jensen *et al*., 2005).

A comparison between the pump-scoop and hand-held dredge revealed no differences in the areas fished in terms of proximity to the shore (i.e., potential displacement of birds) or sediment penetration (i.e., likelihood of impacting on infaunal communities). Further observations also showed no increase in fishing intensity when comparing both dredge types.

The pump-scoop dredge is towed in a circular motion with each tow lasting from 2 to 5 minutes depending on the nature of the seabed. After each tow the pump-scoop dredge is lifted into the vessel and the contents of the dredge basket are emptied directly onto the riddle for sorting. Fishers must sort their catch immediately and return all shellfish under minimum size restrictions, as well as bycatch, to the water. The configuration of the pump-scoop dredge is dictated by the conditions of the permit. These include restrictions on the dimensions of a dredge basket to a maximum of 460 mm in width, 460 mm in depth and 30 mm in height (excluding any poles or attachment). Dredges must be constructed on rigid bars having spaces of no less than 18 mm between them. Bar spacing is designed to allow young spat and infauna to go through the dredge basket (Jensen *et al*., 2005). A riddle with bar spacing of 18 mm is mandatory for the sorting of shellfish.

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

Figure 6. Typical pump-scoop dredge set up with basket dredge, water jets, davit arm and sorting riddle.

4.3 The Poole Harbour Shellfish Fishery: Location, Effort and Scale of Fishing

Prior to the introduction of the PHDP byelaw, commercial shellfish dredging within Poole Harbour was regulated through a combination of the Poole Fishery Order 1985, a hybrid Regulating and Several Order that licensed the wild clam fishery and provided leased ground for shellfish aquaculture, and the 'Cockle' byelaw, which regulated commercial cockle fishing. There was additional clam fishing in areas which fell outside of the Poole Fishery Order 1985, namely Brands Bay and Lytchett Bay. There was also a level of unlicensed/unregistered fishing activity for both clam and cockle, with 18 unlicensed vessels recorded by SIFCA between 1st January 2012 and 1st September 2014.

On 1st July 2015, the Poole Harbour Dredge Permit byelaw was introduced to regulate the use, retention on board, storage and transportation of a dredge through the allocation of permit entitlements. Simultaneously, the Poole Harbour Fishery Order 2015 was also introduced on 1st July 2015 to regulate shellfish aquaculture within the Harbour. Since the introduction of the PHDP byelaw, 45 permit entitlements have been allocated each season (2015/16, 2016/17, 2017/18, 2018/19, 2019/20, 2020/21, 2021/22, 2022/23). During the most recent season (2022/23), 45 out of 45 permit entitlements were taken out.

4.3.1 Fishing Effort and Landings

During each fishing season, under the permit conditions, permit holders are required to submit a monthly catch return form indicating, for each day of the month:

- The hours spent fishing; and
- The quantity in kilograms of each species caught that day; and
- The number of zone(s) in which the quantities of species caught that day have been taken according to the zonation map provided with the catch return form; and
- The name(s) of the company or individual to whom all parts of the catch was sold or declare that no catch was taken on that day by entering the word 'nil' in the column for "Species caught and Quantity"

If no fishing has taken place during a month, the permit holder must indicate this to the Southern IFCA by submitting a 'nil' catch return.

The data from these catch returns is used to analyse trends in fishing activity and is presented in figures 7-12. Statistical analysis has been carried out on the catch data using a non-parametric Kruskal-Wallis test and, where required post-hoc Dunn's method to look for significance between years.

For the 2022/23 season, the number of permit holders actively fishing per month varied from 27 in May to 40 in September. In all years, the number of active fishers generally increases throughout the months of the season, except for the 2016/17 season where a decline in active fishers was seen in August. For all seasons from 2018/19 to 2021/22 the number of active fishers in the last three months of the season (October to December) was at least 40 out of the 45 permit holders, however numbers of active fishers were seen to be lower in the 2022/23 season with 39, 37 and 35 active fishers for October, November and December respectively. Figure 7 shows the variation in the average number of active fishers for each season. Statistical analysis using a Kruskal-Wallis test showed that the average number of active fishers per season was significantly different ($P<0.05$) but the only difference in post-hoc testing (Dunn's method) was between the 2019/20 season and the 2015/16 season with the latter having a significantly lower average number of active fishers. It is important to note that all permit holders actively fish throughout the season but do not necessarily fish for every month of the season. The reasons for this may be related to weather, vessel maintenance, alternative fishing practices, other work commitments or extraordinary circumstances.

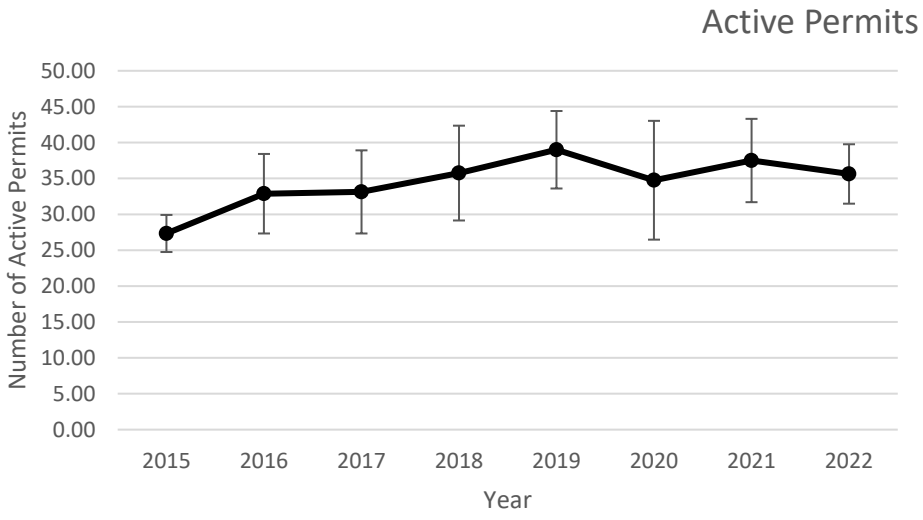

Figure 7: Average number of active permits per season for 2015/16 – 2022/23. Error bars represent the standard deviation.

The total number of hours fished in each month of the season is shown in Figure 8a for all seasons under the Poole Harbour Dredge Permit Byelaw to date. For the 2022/23 season, the total number of hours fished in a month (excluding May where there are only 5 days available for fishing), varied from 1498.0 in December to 2600.50 in August. Statistical analysis of the hours fished between fishing seasons (Figure 8b) showed that there was no statistical difference between seasons for hours fished (P=0.668).

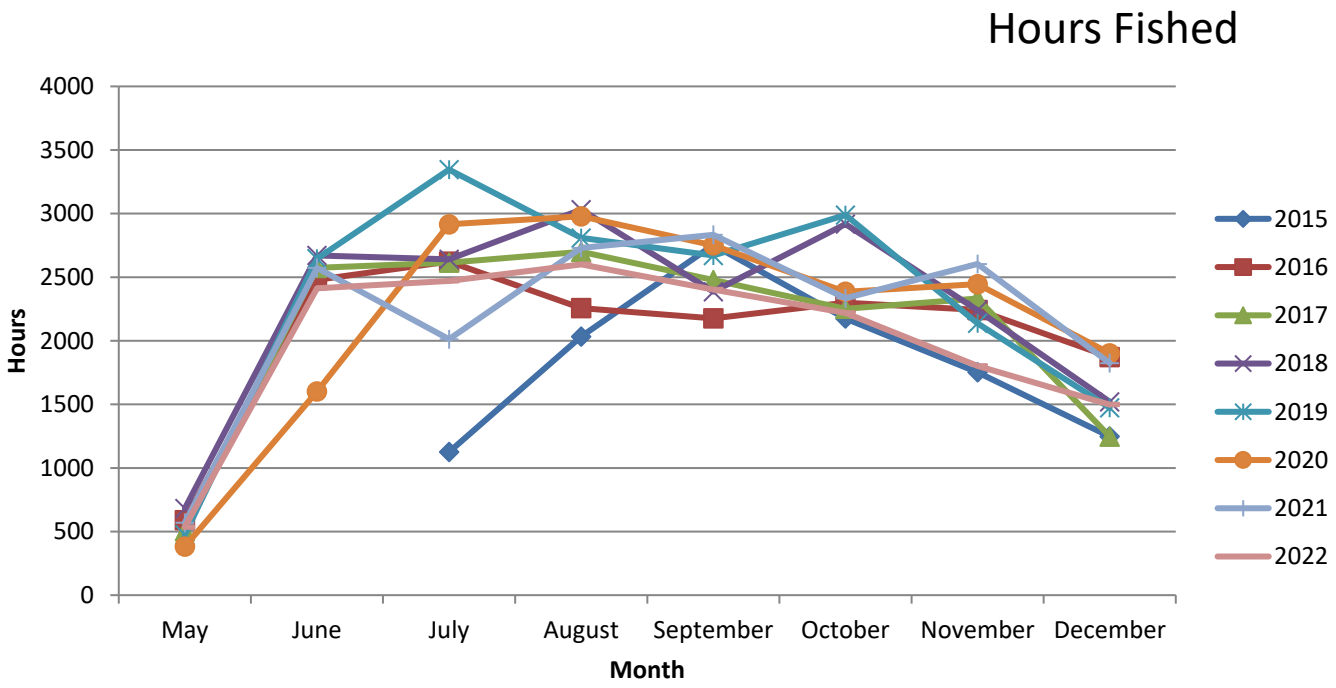

Figure 8a: The total number of hours fished by Poole Harbour Dredge Permit holders for each month of the fishing season from 2015/16 to 2022/23. In 2015, the season commenced on July 1st. For all other years the season commenced on May 25th.

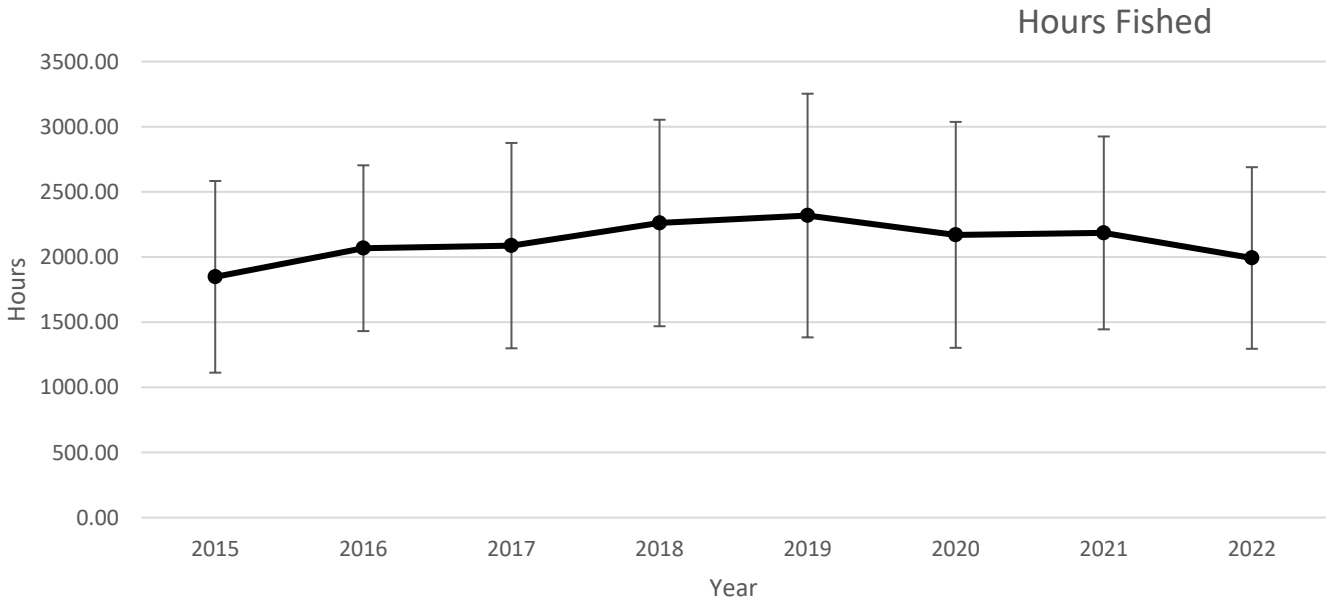

Figure 8b: Average hours fished across the whole fishing season for 2015/16 to 2022/23. The error bars represent the standard deviation.

The main targeted species is the Manila clam (*Ruditapes philippinarum*) which is reflected in the landings data, in comparison to landings for cockle and other bivalve species. The total quantity of Manila clam landed each month of the season is shown in Figure 9a for all seasons to date. For the 2022/23 season, the total quantity of Manila clam landed by all active fishers in a month (excluding May where there are only 5 days available for fishing), varied from 23,726.0kg in December to 60,055kg in July. Statistical analysis of the quantity of Manila clam landed between fishing seasons (Figure 9b) showed that there was a significant difference between seasons ($P<0.05$). Post-hoc testing showed that the quantities landed in 2020/21 and 2021/22 were significantly higher than the quantity landed in 2016/17. A large increase in the quantity of Manila clam landed was observed during the 2020/21 season, since then landings have been seen to steadily reduce each subsequent season back towards the quantities observed in the 2019/20 season. The reason for the large increase in landings in 2020/21 is not known, however the subsequent stock survey in spring 2021 did not indicate any negative impact on the stock from the increase landings.

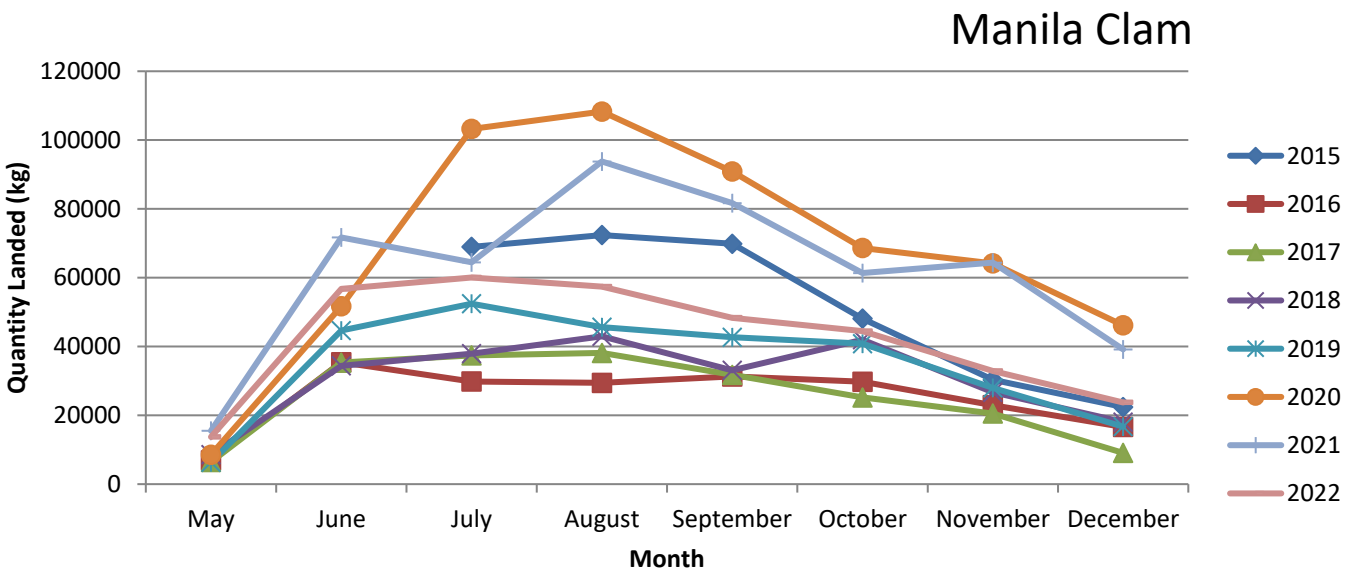

Figure 9a: The total quantity of Manila clam landed by Poole Harbour Dredge Permit holders for each month of the fishing season from 2015/16 to 2022/23. In 2015, the season commenced on July 1st. For all other years the season commenced on May 25th.

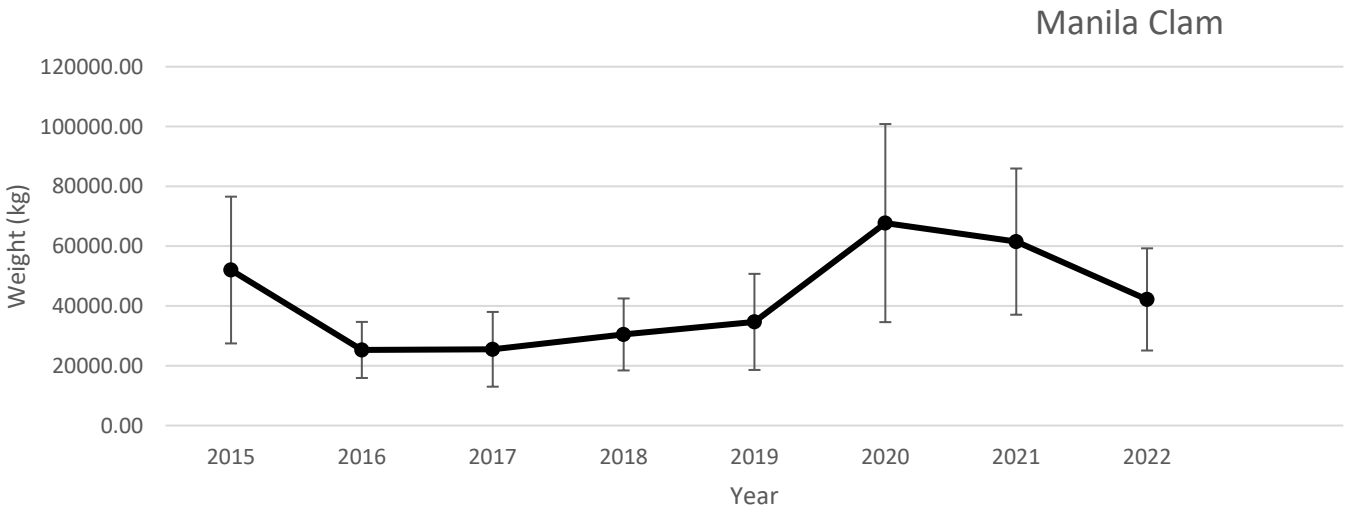

Figure 9b: Average quantity of Manila clam landed across the whole fishing season for 2015/16 to 2022/23. The error bars represent the standard deviation.

A number of fishermen target common cockle (*Cerastoderma edule*) throughout the season; however, it is usually less popular as a target species due to a lower market price, the fact they are less widespread within the Harbour and the difficulties with harvesting the species as they are associated with harder ground. The cockle fishery is also dependent on market demand which can cause large scale monthly fluctuations in catch quantity.

The total quantity of Cockle landed each month of the season is shown in Figure 10a for all seasons to date. For the 2022/23 season, the total quantity of Cockle landed by all active fishers in a month (excluding May where there are only 5 days available for fishing), varied from 2154.0kg in December to 8725.0kg in July. Statistical analysis of the quantity of Cockle landed between fishing seasons (Figure 10b) showed that there was a significant difference between seasons ($P<0.001$). Post-hoc testing showed that the quantities landed in 2018/19 and 2019/20 were significantly higher than the quantity landed in 2020/21. The lower catch levels for 2020/21 may be explained by the higher catches of Manila clam but relatively stable levels of hours fished suggesting that fishers spent similar times fishing but put more effort into targeting Manila clam than other species.

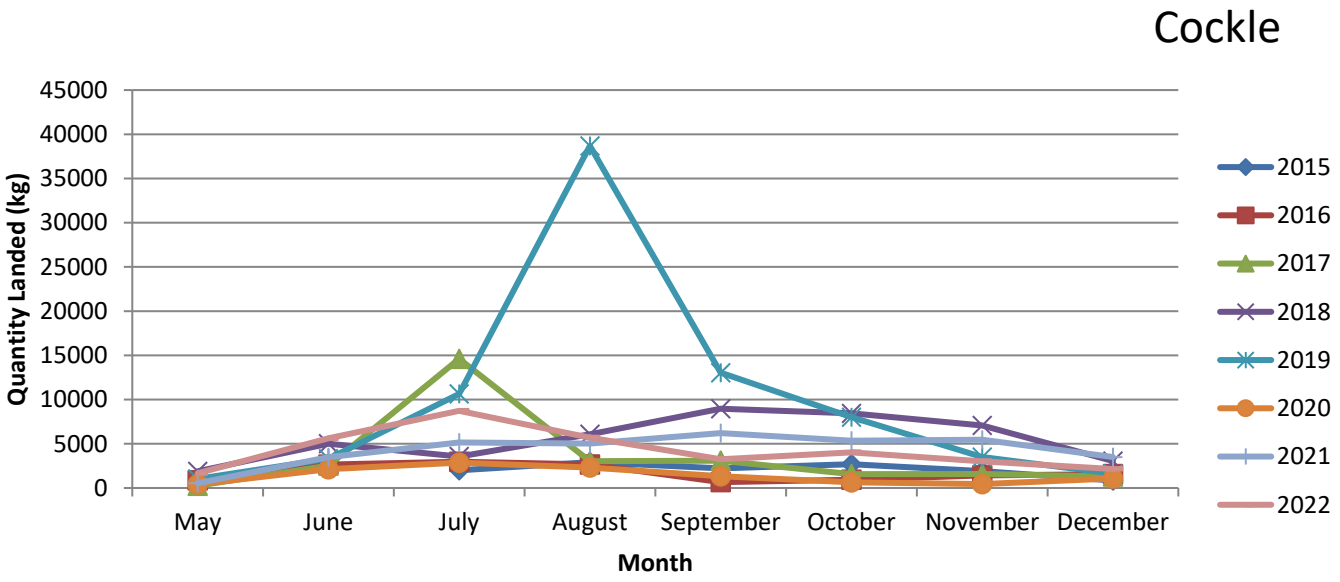

Figure 10a: The total quantity of Cockle landed by Poole Harbour Dredge Permit holders for each month of the fishing season from 2015/16 to 2022/23. In 2015, the season commenced on July 1st. For all other years the season commenced on May 25th.

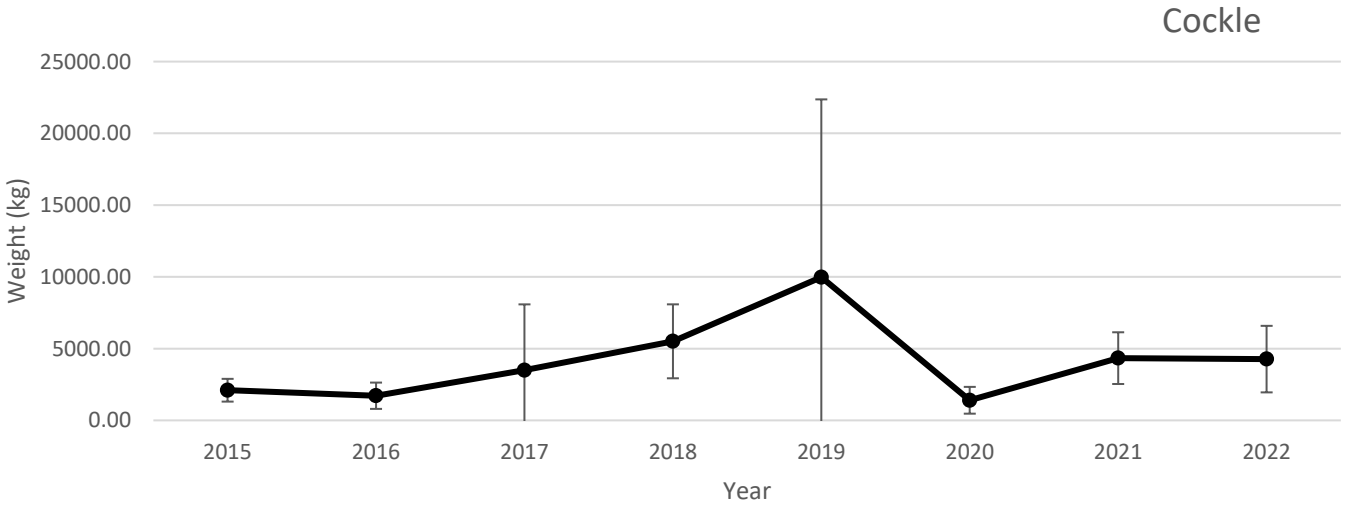

Figure 10b: Average quantity of Cockle landed across the whole fishing season for 2015/16 to 2022/23. The error bars represent the standard deviation.

Other bivalve species caught and landed within Poole Harbour consist predominantly of American hard-shelled clams (*Mercenaria mercenaria*), as well as the native Palourde clam (*Ruditapes decussatus*). The landings of these species are categorised together as 'other shellfish species' and vary largely between each year with no recognisable pattern.

The total quantity of 'other shellfish species' landed each month of the season is shown in Figure 11a for all seasons to date. For the 2022/23 season, the total quantity of 'other shellfish species' landed by all active fishers in a month (excluding May where there are only 5 days available for fishing), varied from 2586.0kg in June to 9642.0kg in September. Statistical analysis of the quantity of 'other shellfish species' landed between fishing seasons (Figure 11b) showed that there was a significant difference between seasons ($P<0.05$). Post-hoc testing showed that the quantities landed in 2022/23 were significantly higher than the quantity landed in 2025/16. In general the landings of 'other shellfish species' have been seen in increase over time, primarily caused by a increase over time in the landing of the American Hard-Shelled clam (*Mercenaria mercenaria*). In previous seasons (2021/22), fishers have indicated that they were getting a higher price per kg for this species than the Manila clam which may explain increased targeting of this species. If this price per kg remains at a good level and there is a market demand for this species, this may explain the upward trend in landings. As in previous years, the quantity of Native Palourde clam landed represents less than 1% of the total shellfish landed during the 2022/23 season. The Palourde clam and the Manila clam are very similar making it difficult to identify the species, particularly out of the water when the siphons are not visible. Whilst the Manila clam is the dominant of the two species, the Palourde clam will often fetch a higher price, and, if in particular demand by markets, fishers may make more of an effort to retain Palourde clams.

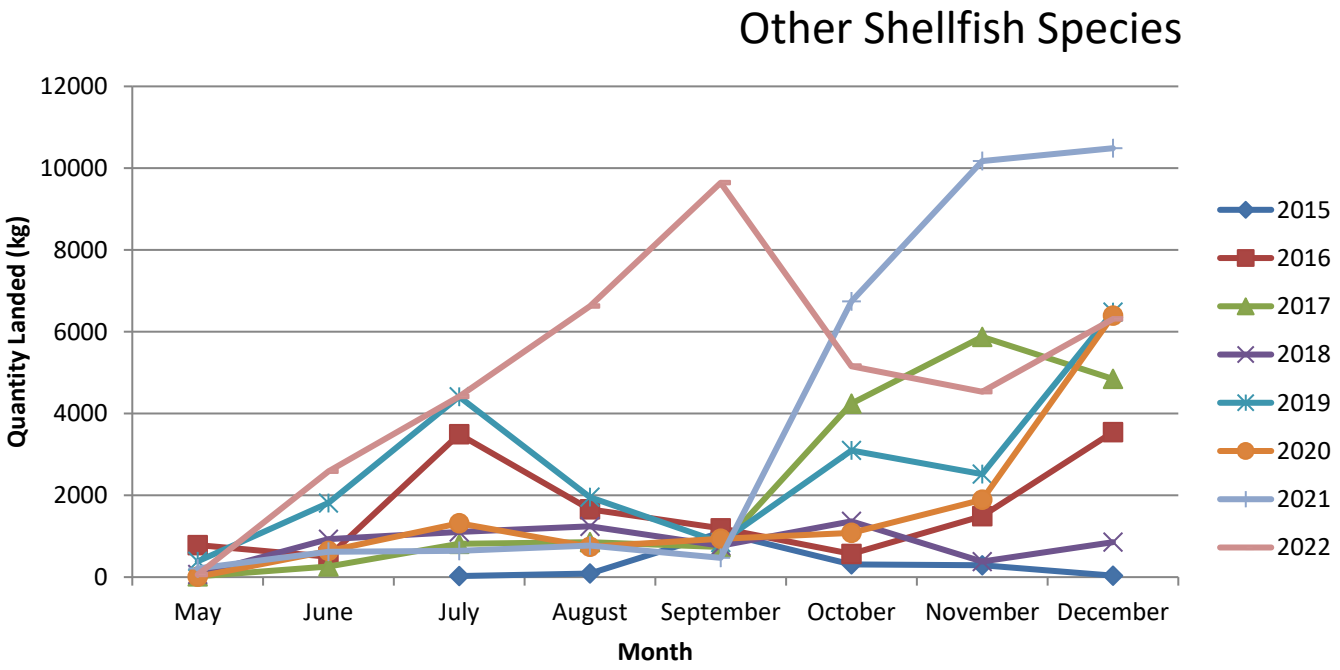

Figure 11a: The total quantity of 'other shellfish species' landed by Poole Harbour Dredge Permit holders for each month of the fishing season from 2015/16 to 2022/23. In 2015, the season commenced on July 1st. For all other years the season commenced on May 25th.

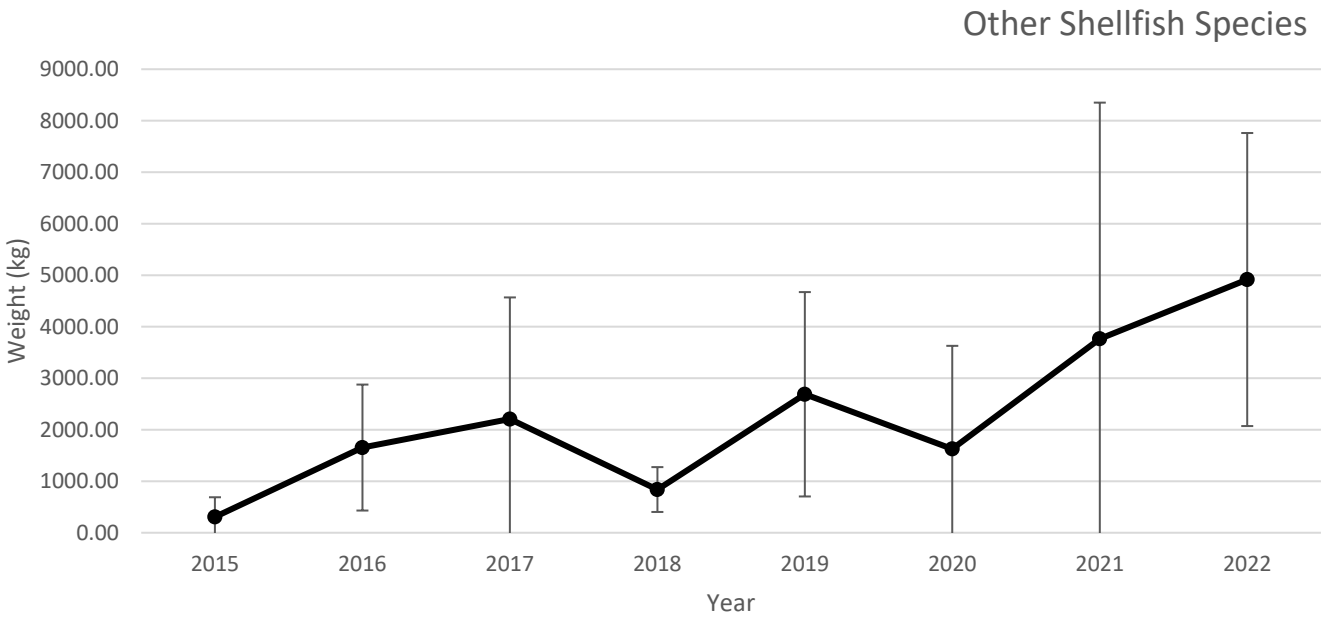

Figure 11b: Average quantity of 'other shellfish species' landed across the whole fishing season for 2015/16 to 2022/23. The error bars represent the standard deviation.

CPUE is measured as kg of shellfish per hour based on the data provided by the fishers in their monthly catch returns. The CPUE for each month of the season is shown in Figure 12a for all seasons to date. For the 2022/23 season, the CPUE varied from 21.49 $kghr^{-1}$ in December to 29.62 $kghr^{-1}$ in July (excluding May where there are only 5 days available for fishing). Statistical analysis of the CPUE between fishing seasons (Figure 12b) showed that there was a significant difference between seasons ($P<0.001$). Post-hoc testing showed that the CPUE for the 2022/23 season was significantly higher than that of the 2016/17 and 2017/18 seasons, the CPUE for the 2021/22 season was significantly higher than that of the 2016/17, 2017/18 and 2018/19 seasons, the CPUE for the 2020/21 season was significantly higher than that of the 2016/17, 2017/18 and 2018/19 seasons and the CPUE for the 2015/16 season was significantly higher than that of the 2016/17 and 2017/18 seasons. There is no significant difference in the CPUE between the last four seasons (2019/20 to 2022/23).

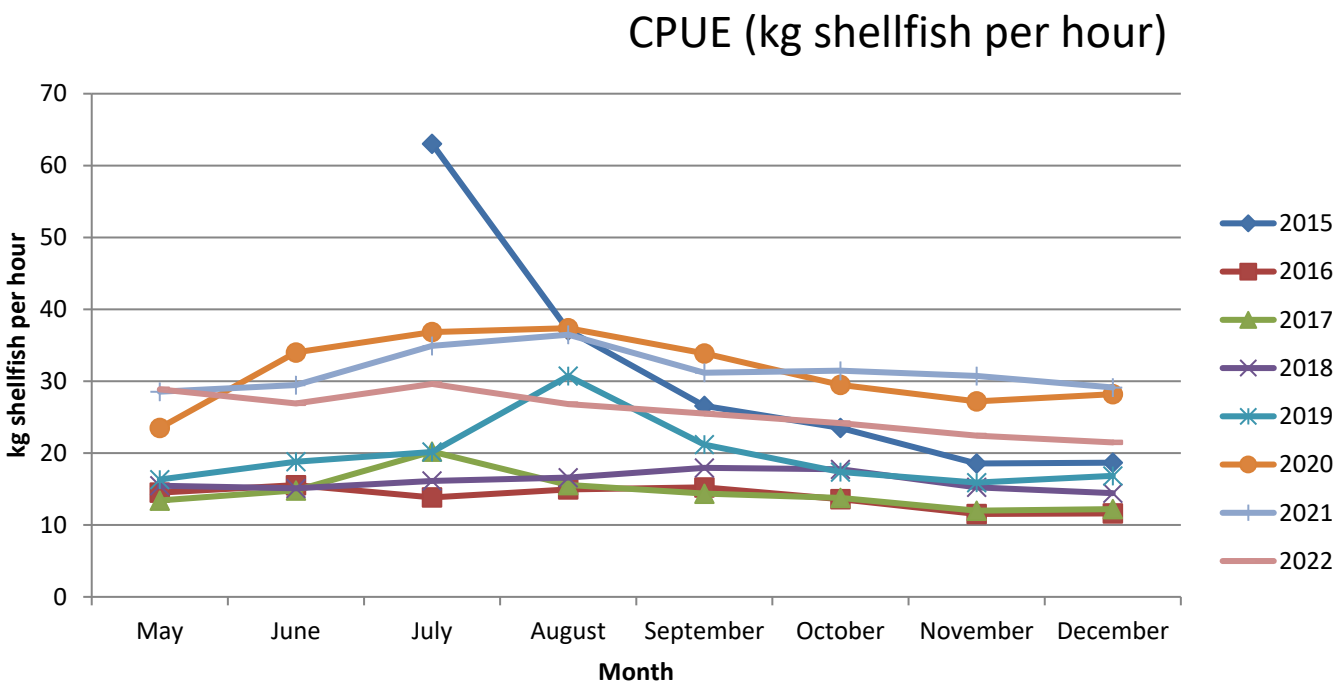

Figure 12a: Catch per Unit Effort (CPUE) measured as kg of shellfish per hour based on the data provided by the Poole Harbour Dredge Permit holders for each month of the fishing season from 2015/16 to 2022/23. In 2015, the season commenced on July 1st. For all other years the season commenced on May 25th.

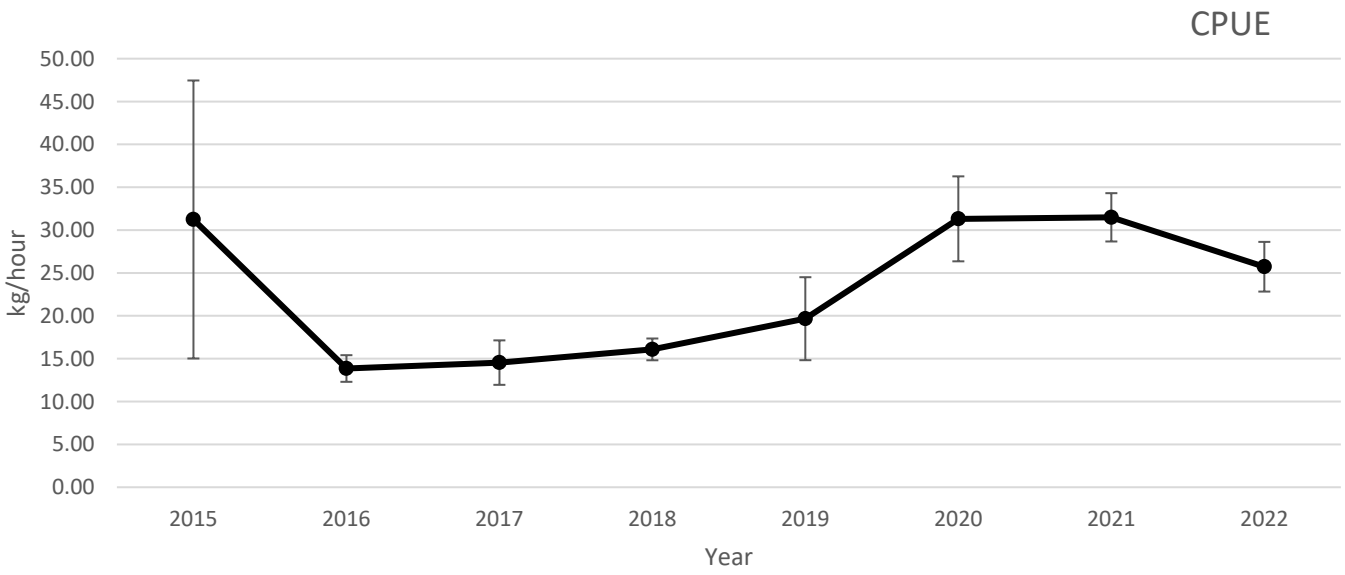

Figure 12b: Average Catch per Unit Effort (CPUE) measured as kg of shellfish per hour across the whole fishing season for 2015/16 to 2022/23. The error bars represent the standard deviation.

4.3.2 Sightings

Shellfish dredging takes in distinct and relatively small spatial areas, where shellfish beds exist. There are a number of beds within Poole Harbour and the level of fishing effort varies between them. This can depend on a number of factors including the target species, substrate type and level of weed. These sites occur intertidally (at high tide) with vessels operating in very shallow waters. Key sites are well illustrated using sightings data (Annex 3). Sightings from the dredge season (25th May to 23rd December) for all seasons up to 2022/23 illustrate distinct areas where shellfish dredging takes place, with activity largely concentrated in the area of Holton Mere and the Wards (between Round Island and Green Island). Sightings data shows shellfish dredging to also take place east of Giggers Island, Arne Bay, Middlebere Lake and Wych Lake, Ower Lake and Brands Bay. Almost all sightings occur within the intertidal. Sightings that occur within seasonal closed areas all occurred during periods when these areas were open to fishing activity (1st July to 31st October). Please note that Southern IFCA's sightings data may reflect the home port of the patrol vessel, high risk areas and typical patrol routes and therefore are only indicative of fishing activity. The frequent nature of patrols conducted in Poole Harbour mean it is likely that the geographical extent of the fishery is well reflected, however intensity may be skewed by aforementioned factors.

4.3.3 Stock Survey Data

The Poole Harbour Bivalve Stock Survey was carried out in April 2022. A survey report has been generated and is available on the Southern IFCA website at https://www.southern-ifca.gov.uk/poole-harbour-fisheries. A summary of the results from the survey is provided:

- The results of the survey focus on the two main commercial species, the Manila clam and the common cockle. Other species found during the survey in smaller quantities included the American Hard-Shelled clam (*Mercenaria mercenaria*), the Native clam (*Ruditapes decussatus*), the native oyster (*Ostrea edulis*), the Pacific oyster (*Magallana gigas*), the spiny cockle (*Acanthocardia aculeata*) and the blue mussel (*Mytilus edulis*).
- The average length for Manila calm was above the MCRS of 35mm at all but four sites, for those four sites the average length was 34mm. The average length for Cockle was above the MCRS of 23.8mm at all sites.
- A measure of Catch Per Unit Effort (CPUE) was calculated as weight of shellfish (kg) per metre of dredge per hour both above and below MCRS for the two species. The Harbour is divided into 11 catch reporting zones under the Poole Harbour Dredge Permit Byelaw therefore CPUE data from the survey was grouped according to the zone in which the survey site is located.
- For Manila clam, statistical analysis showed a significantly higher average CPUE under MCRS in Holes Bay (101.4 kg m of dredge^{-1} hr^{-1}) and Zone 11 (54.6 kg m of dredge^{-1} hr^{-1}) than Zones 1 (23.3 kg m of dredge^{-1} hr^{-1}) and 4 (21.6 kg m of dredge^{-1} hr^{-1}) ($P<0.001$). For CPUE over MCRS there was a significant difference between zones ($P<0.05$), but there was not enough variance between groups to show significant differences in post-hoc testing.
- For Cockle, statistical comparison of CPUE between catch zones for 2022 indicated a significant difference between sites for both above and under MCRS ($P<0.05$), however there was not enough variance between groups to show significant differences in post-hoc testing.
- For Manila clam, statistical comparisons between the last three survey years for each zone (2019-2022) showed that the average CPUE for the 2022 survey for over MCRS was significantly higher than the 2019 survey for Zones 11 ($P<0.001$), 10 ($P<0.05$) and 8 ($P<0.05$) and for under MCRS for Holes Bay ($P<0.05$). For Zone 10 the average CPUE over MCRS was also significantly higher in 2022 than in 2021 ($P<0.05$). The only other significant difference for the 2022 survey data was in Zone 1 where the average CPUE under MCRS was significantly

higher in 2021 than either 2019 or 2022 (P<0.001). Other significant differences were noted for average CPUE over MCRS in Zones 3 and 7 (both P<0.05), however there was not enough variance between groups to show significant differences in post-hoc testing. The visualisation of the data indicates that the average CPUE over MCRS for Zones 3 and 7 was higher in 2022 than in the previous two years. Zone 4 showed a significant difference for average CPUE under MCRS (P<0.05), however again there was not enough variance between groups to show significant differences in post-hoc testing.

- For Cockle, statistical comparisons between the last three survey years for each zone (2019-2022) showed significant results only for Zones 7, 10 and 11. For Zone 7, average CPUE under MCRS was significantly different between years (P<0.05), however there was not enough variance between groups to show significant differences in post-hoc testing. For Zone 10, the average CPUE over MCRS was significantly higher in 2022 than 2019 (P<0.05) and for under MCRS was significantly higher in 2022 than 2019 or 2021 (P<0.001). For Zone 11, average CPUE under MCRS was significantly higher in 2022 than in 2021 (P<0.05).
- Higher CPUE values for both Manila clam and cockle are consistent with popular fishing areas for each species and reflects a habitat driven distribution with Manila clam showing a higher CPUE in muddy, fine-grained sediments and cockle showing a higher CPUE in sandy, coarse-grained sediments. The higher levels of Manila clam under MCRS in Zones 10 and 11 is also consistent with preferred habitat type and areas within those zones which are sheltered and potentially provide a suitable area for settlement of larvae.
- Where significant differences in CPUE for both species were noted between survey years, the 2022 survey data showed a higher CPUE than at least one of the previous two years (except in Zone 1 for Manila clam under MCRS). This indicates that the stock appears to be robust to the fishing pressure exhibited in the previous season. For Manila clam in particular, the stock appears to be able to withstand the observed increase in fishing pressure in 2020 and, although slightly lower, in 2021 compared to landings in 2019 and previous years.

5 Test of Likely Significant Effect (TLSE)

The Habitats Regulations assessment (HRA) is a step-wise process and is first subject to a coarse test of whether the plan or project will cause a likely significant effect on an EMS[10]. Each feature/sub-feature was subject to a TLSE, a summary table is provided in Annex 7. Only those features or supporting habitats where there was potential for likely significant effect have been included.

[10] Managing Natura 2000 sites: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

6 Appropriate Assessment

Note: this is only to be undertaken if the Test for LSE (section 5) concluded 'Yes' or 'Uncertain' for LSE, either alone or in-combination.

6.1 Co-location of Bird Features (and their supporting habitats) and Project/Plan(s)

Key areas favoured by designated bird species in Poole Harbour SPA are summarised in table 2.

Table 2. Key areas for designated bird species in the Poole Harbour SPA. Information taken from the draft supplementary advice on conserving and restoring site features, Natural England's Conservation Advice Package and Poole Harbour Aquatic Management Plan Appendix 5 (Selection of Bird Sensitive Areas in Poole Harbour).

Common Name	Latin Name	Favoured Area(s)
Avocet	*Recurvirostra avosetta*	Roosting areas include Brownsea Lagoon, towards the end of Wych and Middlebere channel and on the Spartina saltmarsh in north Holes Bay. Main feeding areas include Wych and Middlebere channels, Brownsea Lagoon, East Fitzworth.
Black-tailed godwit	*Limosa limosa islandica*	To feed, flocks tend to congregate in one bay, including Holes Bay or Lytchett Bay and roosting is limited to the area in which they are feeding. Preferred feeding sites also include Brownsea Lagoon. Arne Bay, Brands Bay, Wych Lake, Newton Bay, Ower Bay and Middlebere Lake and Brownsea Lagoon are important roost sites for waders, including black-tailed godwit.
Common tern and Sandwich tern	*Sterna hirundo*	Brownsea Island lagoon is the site of the principal and probably only nesting colony of common terns and Sandwich terns within the Poole Harbour SPA.
Mediterranean gull	*Larus melanocephalus*	Only confirmed breeding colony in Poole Harbour is saltmarsh islands of off Holton Heath where the species nests alongside black-headed gulls.
Shelduck	*Tadorna tadorna*	Feeding takes place throughout the harbour, although favoured areas include Keysworth, Hole Bay and Brands Bay. Keysworth is reported to be an important area for feeding, with the food requirements for the numbers of shelduck recorded to exceed food availability.

Eurasian spoonbill	*Platalea leucorodia*	Brownsea Lagoon and Middlebere channel represent favoured feeding sites. Species is also recorded at other locations including Arne and Holes Bay. but also recorded at other locations e.g. Arne and Holes Bay
Little egret	*Egretta garzetta*	Occurs throughout the harbour. Known to roost in trees around Littlesea (the dune slack lake on Studland) and Plantation trees in Arne.
Curlew	*Numenius arquata*	Keysworth is reported to be an important area for feeding, with the food requirements for the numbers of curlew recorded to exceed food availability.
Redshank	*Tringa totanus*	Arne Bay, Brands Bay, Wych Lake, Newton Bay, Ower Bay and Middlebere Lake are important roost sites for waders, including redshank.
Greenshank	*Tringa nebularia*	Arne Bay, Brands Bay, Wych Lake, Newton Bay, Ower Bay and Middlebere Lake are important roost sites for waders, including greenshank.
Waterbird assemblage, non-breeding	Over 20,000 waterbirds over the winter	All of the above sensitive areas are utilised by bird species comprising the waterbird assemblage. Saltmarsh habitats, seagrass beds and reedbed are all important supporting habitats.

A map of shellfish dredging and supporting habitats can be found in Annex 8. This reveals where shellfish dredging activity occurs in relation to designated supporting habitats of the site and shows activity occurring over intertidal mud and in the vicinity of saltmarsh. Using knowledge presented in table 2, shellfish dredging may have some effect on sites used by avocet, black-tailed godwit, Mediterranean gull, shelduck, Eurasan spoonbill, curlew, redshank and green shank. The sites used by these species, which occur in relatively close proximity to shellfish dredging, include outer Wych and Middlebere, Arne Bay, Ower Bay, Newton Bay, Brands Bay, Holton Mere and Keysworth. A number of key feeding and roosting sites identified in table 2 are however not affected by shellfish dredging either by the fact they are inaccessible to fishing vessels (Brownsea Lagoon) or through the year-round closure of certain areas (i.e., Lytchett Bay and Holes Bay).

The potential effect on the sites utilised by designated bird species however is mitigated through a number of permit conditions associated with the Poole Harbour Dredge Permit byelaw, principally, spatial and temporal restrictions and timing of the season (see section 6.6, table 9 for further details). It is also worth noting some effects, particularly disturbance, will be negated by the virtue that birds feed at low tide and shellfish dredging occurs at high tide.

6.2 Potential Impacts

Prior to the introduction of the PHDP byelaw in July 2015, Natural England provided initial advice on the potential impacts of shellfish dredging on the nature conservation features of Poole Harbour. Using the potential impacts identified in this advice, combined with the pressures outlined the

Advice on Operations (and identified in the TLSE process), a list of pressures and relevant attributes has been put together and is outlined below. In this section, these pressures are elaborated on using available scientific literature and results from relevant research.

Pressure	Relevant Attribute
Visual disturbance, Above water noise	Supporting habitat: disturbance caused by human activity
Physical change (to another sediment type)	Supporting habitat: extent and distribution of supporting non-breeding habitat; Supporting habitat: extent and distribution of supporting habitat for the breeding season
Removal of non-target species	Supporting habitat: food availability within supporting habitat; Supporting habitat: food availability within the intertidal
Removal of target species	Supporting habitat: food availability within supporting habitat; Supporting habitat: food availability within the intertidal

6.2.1 Disturbance (visual and noise)

Generic impacts

Human disturbance to shorebirds can be defined as 'any situation in which human activities cause bird to behave differently from the behaviour it would exhibit without presence of that activity' (Wheeler *et al*., 2014). The response of birds to disturbance is influenced by a number of factors, including distance from the disturbance source, scale of disturbance and time of year (Stillman *et al*., 2009). Disturbance from many small-scale sources is thought to be more detrimental than fewer, large-scale sources (West *et al*., 2002).

Disturbance can result in displacement when birds are unable to use an area due to the magnitude of the disturbance present (Natural England, 2014). Under certain circumstances the impacts of disturbance may be equivalent to habitat loss, although such effects are reversible (Madsen, 1995; Hill *et al*., 1997; Stillman *et al*., 2007; Natural England *et al*., 2012). The effects of habitat loss through disturbance can include a reduction in the survival of displaced individuals and effects on the population size (Goss-Custard *et al*., 1995; Burton *et al*., 2006). Sites with high levels of human activity are often characterised by lower densities of birds when compared with sites that have low levels (Burger, 1981; Klein *et al*., 1995). The movement of birds to alternate feeding areas as a result of disturbance, which may be less suitable, can lead to increased shorebird density and thus interspecific competition; with alternate sites becoming depleted in food resources if used for prolonged periods of time (Goss-Custard et al., 2006; Wheeler *et al*., 2014). Disturbance can affect wintering bird populations in a number of ways including reduced intake a result of enhanced vigilance (Riddington 1996; Goss-Custard *et al*. 2006; Klaassen *et al*. 2006) and physiological impacts such as stress (Thiel *et al*., 2011). Such impacts can affect the fitness of individuals and have knock-on effects at a population scale (Natural England, 2011). Furthermore, disturbance can cause birds to take flight which increase energy demands and reduce food intake with potential consequences for survival and reproduction.

Birds can modify their behaviour in order to compensate for disturbance (Stillman *et al*., 2009). Some bird species may become habituated to particular disturbance events or types of disturbance (Walker *et al*., 2006, Nisbet, 2000, Baudains & Lloyd, 2007; Blumstein *et al*., 2003) and can do so over short periods of time (Rees *et al*., 2005; Stillman *et al*., 2009). The frequency of the disturbance will help to determine the extent to which birds can become habituated and thus the distance at which they respond (Stillman *et al*., 2009). The behavioural response of a bird to disturbance is also dependent on the time of year (Stillman *et al*., 2009). Towards the end of winter, when migratory birds need to increase feeding rates to provide energy for migration, behavioural response to disturbance is less (Stillman *et al*., 2009). Birds will approach a disturbance source more closely and return more quickly after a disturbance has taken place (Stillman *et al*., 2009).

In the context of shellfish harvesting from a vessel, limited has taken place to investigate its potential effects on bird populations through disturbance. It is thought that shellfish dredging has very little direct impact on disturbance of waders since it occurs at high tide (Sewell *et al*., 2007). Sewell *et al*. (2007, p. 51) stated that 'We know of no evidence that dredging will have a direct impact in terms of disturbance on seabirds since most dredging occurs subtidally or at high-tide'. Wheeler *et al*. (2014) however stated, like other forms of disturbance, it could cause relocation and increased energy expenditure of birds

Examples of disturbance impacts

In the mid-1980s, localised and sustained disturbance from bait diggers at Lindisfarne National Nature Reserve were considered responsible for significant declines in the numbers of Wigeon, Bar-tailed Godwit and Redshank at the site (Townshend & O'Connor, 1993).

In 1996/97, Gill *et al*. (2001a) investigated the effect of human-induced disturbance on black-tailed godwits across 20 sites on the east coast of England. The study revealed no significant relationship between numbers of godwits and human activity at a range of spatial scales (Gill *et al*., 2001a). There was also no effect of the presence of marinas or footpaths on the number of godwits supported on the adjacent mudflats (Gill *et al*., 2001a).

Using a behaviour-based model, Durell *et al*. (2005) explored the effect if an extension to the port at Le Havre and proposed mitigation measures on the mortality and body condition of three overwintering bird species; curlew, dunlin and oystercatcher. Body condition was expressed as the percentage of birds failing to achieve at least 75% of their target weight for the time of year. Disturbance to feeding birds, day and night, had a significant effect on the mortality and body condition of all three species. The same was found for roosting birds. Roost disturbance was simulated by increased energy costs due to extra flying time of 10 minutes or more each day. Disturbance limited to the daytime only removed the effect of disturbance in curlew and oyster catcher, and although reduced the disturbance effect it still had a significant effect on the body condition and mortality of feeding dunlin. The introduction of a buffer zone, which would prevent disturbance within 150 m of the seawall, reduced the effects of disturbance on mortality and body condition to pre-disturbance levels.

Studies in the Solent which have focused on disturbance to birds, have reported disturbance levels of 30% during the winter of 1993/94 using disturbance events observed during low tide counts. Sources of disturbance from human activity on the shore included dog walkers, walkers, bait diggers and kite flyers (Thompson, 1994). A more recent study conducted from December 2009 to February 2010, which formed phase II of the Solent Disturbance & Mitigation Project, found for water-based recreational activities that 25% of observations resulted in disturbance and on the intertidal 41% of observation result in disturbance (Liley *et al*., 2010). Surfing, rowing and horse riding were activities found to most likely result in disturbance to birds. Over half of incidences where major flight was observed involved activities on the intertidal, with dog walking accounting for 47% of major flight events (Liley *et al*., 2010). The most responsive bird species to different activities were oyster catcher and wigeon (Liley *et al*., 2010). These two species had the highest proportion of observations involving a disturbance response. Primary data collected by Liley *et al*. (2010) was used to predict if disturbance could reduce the survival of birds using computer models (Stillman *et al*., 2012). Dunlin, ringed plover, oystercatcher and curlew were predicted to be the species most vulnerable to disturbance due to a combination of disturbance distances (see species-specific response), night-time feeding efficiency and vulnerability to food competition at high competitor densities (Stillman *et al*., 2012). Redshank, grey plover and black-tailed godwit typically had the shortest disturbance distances and were able to feed relatively effectively at night, meaning that these species were less affected by visitors (Stillman *et al*., 2012). Disturbance was predicted to result in increases in the level of time spent feeding intertidally by dunlin, ringed plover, redshank and grey plover, with no effect on black-trailed godwit and reductions in oystercatcher and curlew (Stillman *et al*., 2012). This was related to the ability of modelled birds to feed in terrestrial habitats, as those unable to do so spent longer feeding in intertidal habitats (Stillman *et al*., 2012).

Site-specific impacts

Liley and Fearnley (2012) surveyed a total of 15 sites located within the vicinity Poole Harbour between November to February, recording access levels, birds counts and bird response to disturbance, in addition to paired night and day counts at 13 sites. During the survey period there was 1981 potential disturbance events, generating a total of 3755 species-specific observations. Of these, 87% resulted in no visible change in behaviour or response and 12% resulted in some form of disturbance, with 6% involving birds undertaking major flight. Disturbance was found to have a significant effect on the numbers of waders and wildfowl present and overall 5.6 potential disturbance event were recorded per hour and a response of 1.7 times per hour, with birds flushed approximately once per hour. In December, the number of disturbance events resulting in a response, particularly birds being flushed, was markedly higher and locations where birds were more frequently flushed included Arne and Studland. In areas with the highest levels of access, bird was found less likely to respond to a disturbance event. Dog walkers without a lead accounted for 40% of birds flushed, followed by walkers (17%) and canoeists (17%).

A number of variables were found to influence the probability of major flight, including distance, with a shorter disturbance more likely to result in major flight, flock size, with a larger flock less likely to result in major flight, as well as the presence of a dog, availability of alternate foraging or roosting sites, temperature and the bird species present. A higher probability of major flight was recorded for curlew, oystercatcher and shelduck. The highest proportion of flushing in response to a disturbance events were seen in the species red-breasted merganser and sanderling. Water-based activities, including canoeing, pump-scoop dredging, small sailing boats and kite surfing, relative to other activities, were more likely to cause

disturbance. This activity type made up a relatively small proportion of all recorded activities and it is worth noting the low sample sizes for water-based activities, with only 2 observations of pump-scoop dredging throughout the survey period. Thus, distorting the likelihood of disturbance, if for example major flight occurred 1 out of 2 observations, disturbance would be considered to occur 50% of the time.

Species-specific response

Responsiveness to disturbance is thought to be a species-specific trait (Yasué, 2005). Gathe and Hüppop (2004) developed a wind farm sensitivity index (WSI) for seabirds. The index was based on nine factors, derived from specie' attributes, and include; flight manoeuvrability, flight altitude, percentage of time flying, nocturnal flight activity, sensitivity towards disturbance by ship and helicopter traffic, flexibility in habitat use, biogeographical population size, adult survival rate and European threat and conservation status (Gathe & Hüppop, 2004). Each factor was scored on a 5-point scale from 1 (low vulnerability of seabirds) to 5 (high vulnerability of seabirds). The WSI was used by King *et al*. (2009) to develop sensitivity scores for species likely to be susceptible to cumulative impacts of offshore wind farms development. Table 3 provides available sensitivity scores of species within Poole Harbour SPA, with details of scores given for the species vulnerability to disturbance by ship and helicopter traffic.

Table 3. Sensitivity scores for designated bird species in the Poole Harbour SPA to offshore wind farm developments. Higher scores are indicative of a greater sensitivity. Information on species vulnerability to disturbance by ship or helicopter traffic is also provided. Scores were taken from King *et al*. 2009 who calculated scores using methods by Garthe & Hüppop (2004).

Species	Total sensitivity score	Disturbance by ship and helicopter traffic (1 – very flexible in habitat use, 5 – reliant on specific habitat characteristics)
Sandwich tern	25.0	2
Dark-bellied Brent goose	21.7	2
Red-breasted merganser	21.0	3
Goldeneye	15.8	3
Common tern	15.0	2
Black-tailed godwit	9.9	1
Black-headed gull	7.5	2
Redshank	6.7	1
Curlew	5.7	1
Shelduck	5.3	1
Teal	3.8	1
Dunlin	3.3	1

There is great variation in the escape flight distances between species (Kirby *et al*., 2004) and the distance at which birds fly away from a disturbance can be viewed as a specie-specific trait (Blumstein *et al*., 2003). Response distances can depend on a number of different factors, including the time of year, tide, frequency, regularity and severity of disturbance, flock size and age of bird (WWT Consulting, 2012). Body mass has also been shown to be positively related to response distance (Liley *et al*., 2010). Table 9 and 10 provides details of response distances of species within Poole Harbour SPA, with Table 4 providing details of response distances in relation to different types of activities.

Table 4. Distances from disturbance stimuli (in metres) at which study waterbird species took flight. Taken from Kirby *et al*., 2004 in WWT Consulting 2012.

	Study						
	Tydeman 1978	Cooke 1980	Tensen and van Zoest	Watmough 1983a,b	Smit and Visser 1993	Smit and Visser 1993	Smit and Visser 1993
Activity	Boats	Researcher	People	Researcher	People	Kayaks	Surfers
Distance measure	Min	Mean	Mean	Mean	Mean	Mean	Mean
Brent goose					105		
Shelduck		126			148/250	220	400
Teal	400	86					
Pochard	60						
Goldeneye	100	168		280			
Dunlin		30			71/163		
Redshank		92	95			175	260

Mitigation

The effects of disturbance on the quality of an area for birds are reversible (Natural England *et al*., 2012). Studies have shown that bird numbers increase when either the source of disturbance is removed or mitigated (Natural England *et al*., 2012). Modelling of wintering oystercatchers on the Exe estuary revealed that preventing disturbance during late winter, when feeding conditions are harder and a migratory bird's energetic demands are higher, has been shown to largely eliminate any predicted population consequences (West *et al*., 2002). Following this modelling, it was recommended that to eliminate predicted population consequences of disturbances, competent authorities responsible for management should prevent disturbance to birds during late winter (West *et al*., 2002).

Establishing flight-initiation distances may be considered a starting point for competent authorities responsible for management in order to minimise adverse effects of disturbance (Wheeler *et al*., 2014). The establishment of such buffer areas are dependent on a number of factors including population densities, food availability, time of year and behaviour of individuals (Wheeler *et al*., 2014). As aforementioned, a buffer zone of 150 m from the seawall was found to reduce the effects of disturbance from an extension to the port at Le Havre on the mortality and body condition to

pre-disturbance levels for three bird species (dunlin, curlew and oystercatcher) (Durell *et al*. 2005). Investigation into disturbance caused by recreational activities in the Solent however suggested that there was no clear set-back distance, for all species on all sites due to the large variability observed in response distances, which would result in no disturbance (Liley *et al*., 2010). The largely variability in flight-initiation distances suggests that competent authorities should be conservative when developing buffer zones, although previously published flight-initiation distances for a given species may be used as a guideline for setting buffer zones (Blumstein *et al*., 2003).

Whilst many authors may try and define a distance beyond which disturbance is assumed to have no effect, which is then used in turn to determine set-back distances, it may be inappropriate to set such distances (Stillman *et al*., 2009). The reason for this is because of the variation between species (Blumstein *et al*., 2005), as well as variation between individuals of the same species (Beale & Monaghan, 2004). This is further compounded by particular circumstances such as habitat, flock size, cold weather, variations in food availability, all of which will influence a birds' ability to response to disturbance and hence the scale of the impact (Rees *et al*., 2005; Stillman *et al*., 2001). In addition, there is no guarantee that the behavioural response i.e. response distance, will be related to population consequence (Gill *et al*., 1996; 2001b).

6.2.2 Physical change (to another sediment type)

Advice from Natural England, received prior to the introduction of the PHDP byelaw, outlining the potential impacts of shellfish dredging on the nature conservation features of the Poole Harbour SPA, highlighted a concern related to the potential erosion of saltmarsh taking place where shellfish dredging occurs in close proximity to this habitat type. Natural England advice refers to a study undertaken by Dyrynda (1995) in Liley *et al.* (2012) looking at the impacts of bait dragging on the seabed within Poole Harbour, who states

'Bait dragging would undoubtedly cause substantial damage to communities involved rooted species such as saltmarsh, seagrass and peacock-worm beds. However, these areas are not usually suitable for dragging and are avoided (R. Castle, pers. comm).'

As stated by Natural England and recognised in the above statement with regards to bait dragging, pump-scoop dredging is unlikely to occur over saltmarsh. This is further supported by a lack of literature on the impacts of towed gear with regards saltmarsh habitats, as any interaction between the two is not thought to occur (i.e., Hall *et al*., 2008; Roberts *et al*., 2010). Whilst fishing on saltmarsh is not a common occurrence, dredging has the potential to result in accidental interactions which could impact the root system of the saltmarsh. In addition, fishing in close proximity to saltmarsh habitat may cause an impact through changes in sedimentary conditions and increased wave exposure.

Saltmarsh habitat provides important ecosystem services including as a supporting roosting and breeding habitat for bird species, nursery areas for juvenile fish and in coastal protection via dissipation of wave energy (Moller *et al.,* 2001). Additionally, saltmarsh has been found to be a modest but sustained sink for atmospheric carbon dioxide (Burden *et al.,* 2013). Physical mechanisms resulting in changes to saltmarsh include a lack of sediment in the system (Ravens *et al.,* 2009) which has been attributed to sea level rise (Townend *et al.,* 2007) and dredging and disturbance

mechanisms which create changes to the tidal prism that then result in saltmarsh retreat (Cox *et al.,* 2003). Increased wave action as the seaward edge of saltmarsh has also been postulated to contribute to saltmarsh decline (Burd, 1992). Waves from boat wakes have been noted to contribute to this and result in front erosion of marshes (Ravens *et al.,* 2009). Additional impacting physical factors include storms and extreme weather events which can increase wind and wave exposure, altered sediment distribution from tidal asymmetry and slack water periods, and general variation in tidal range (Gardiner, 2015). Similar contributing factors have been identified to contribute to saltmarsh decline in the Greater Thames area (van de Wal and Pye, 2004). It is agreed that multiple drivers are likely to be responsible for saltmarsh decline (Gardiner, 2015) and for studies in other sites such as the Netherlands, it has been found that the feedback mechanisms between plant growth, morphology and hydrodynamics of both saltmarsh and the surrounding mudflats required consideration in determining the status of saltmarsh and potential impacts (van de Wal *et al.,* 2008). Recovery of saltmarsh appears to be dependent on the species but some species in Poole Harbour are known to be slow to recover. Recovery is dependent on recruitment from other populations and the ability to replace eroded sediment. In some cases, recovery may take up to five years.

While there are no studies directly on impacts from dredge fishing activity, a PhD thesis examining saltmarsh change in Poole Harbour identified fishing activity as being a potential additional human driver for saltmarsh change (Gardiner, 2015). The thesis states that during field work, deep grooves were observed in some of the mudflats fronting saltmarsh areas that were felt to be linked to the shellfish dredge fishery (Gardiner, 2015). It was identified that the mudflats in question were relatively high in the tidal frame and would therefore only be accessible to vessels at high tide with any sediment suspended into the water column during dredging likely to be redistributed during the following ebb tide (Gardiner, 2015). It was suggested that further work would be required to determine the impacts of shellfish dredging on the sediments and how this links to a potential driver for saltmarsh change (Gardiner, 2015).

6.2.3 Removal of target species

Commercial shellfisheries can provide a potential source of conflict by competing with the same food resources as certain bird species (Schmechel, 2001; Atkinson *et al*., 2003). The removal of food resources by shellfishing therefore has the potential to have detrimental effects on the amount of food available per bird and subsequently increases the chance of a threshold being reached where mortality from starvation begins to increase (West *et al*., 2005; Navedo *et al*., 2008). The removal of shellfish from productive beds, along with associated disturbance, can drive birds from preferred feeding grounds to areas of poorer quality. This can lead to an increase in bird densities and a subsequent intensification of interference and exploitation competition for food which can reduce intake rate and probability of starvation, particularly in winter (Goss-Custard & Verboven, 1993; Clark, 1993; Goss-Custard *et al*., 1996). It is important to understand to what degree bird species are able to switch to other food resources, if their target species (that may also be the target species of the fishery) is reduced (Schmechel, 2001). It was reported by Zwarts *et al*. (1996a) that along the north west European coast there are limited possibilities of alternative prey items for certain bird species, especially in winter due to changes in availability (Schmechel, 2001). Using individual behaviour-based models it has been shown that shellfish stocks should not fall below 2.5 to 8 times the biomass that shorebird populations require to survive (Stillman *et al*. 2003; Goss-Custard *et al*. 2004; Stillman *et al*. 2010).

A link has been shown between the state of shellfish stocks and oystercatcher survival in the Wash (Schmechel, 2001). The Wash, constitutes an important estuary for supporting large numbers of wintering waterfowl (310 000), including internationally important numbers of knot and oystercatcher (Schmechel, 2001; Atkinson *et al*., 2003). The area also supports one of the three major cockle fisheries in Britain (Atkinson *et al*., 2003). The majority of cockle harvesting involves the use of continuous delivery hydraulic suction dredges (Bannister, 1998; 1999). Between 1990 and 1999, stocks of cockles and mussels collapsed following a period of poor recruitment and high levels of fishing effort in the 1980s (Bannister, 1998; 1999). During this period, oystercatcher populations fell from 110,000 to 40,000 (Atkinson *et al*., 2000). Population modelling has confirmed that declines in the availability of these prey items were associated with changes in oystercatcher survival between 1970 and 1998, which included three periods of mass mortality (Atkinson *et al*., 2003). Oystercatchers are particularly sensitive to low cockle stocks in years where stocks of mussels are also low and in the Wash, it is thought that mussels act as a buffer during periods when cockle numbers are low (Atkinson *et al*., 2003; Velhurst *et al*., 2004). In the Wash, oystercatcher mortality occurred during winters when stocks of both species were low (Atkinson *et al*., 2003).

Atkinson *et al*. (2010) investigated overall changes in the waterbird assemblage in the Wash between 1980-1982 and 2002-2003. During this study period, the waterbird assemblage underwent a gradual change from one being dominated by species with a high proportion of bivalves or 'other' prey i.e. crustaceans and fish in their diet to those with a higher proportion of worms (Atkinson *et al*., 2010). Three winters in this period were characterised by elevated levels of oystercatcher mortality, 5 to 13 times greater than normal winter levels (Atkinson *et al*., 2010). The great declines were observed in oystercatcher, knot and shelduck (Atkinson *et al*., 2010). Bar-tailed godwit and grey plover showed large increases over the study period. As expected, these changes were found to be significantly related to mussel and cockle stock levels and nutrient levels to a lesser extent (Atkinson *et al*., 2010). Six out of 11 bird species investigated, showed significantly lower rates of annual change in the 10 years before and after the crash of mussel stocks (which occurred during 1992) (Atkinson *et al*., 2010).

There have also been changes in the bird populations in other areas were cockle fisheries are known exist. Like the Wash, the Burrey Inlet cockle fishery saw a decrease in the number of oystercatchers feeding in the inlet for a number of years, in response to removal of less than 25% of available cockle stocks (Norris *et al*., 1998). Oystercatcher numbers remained stable or slightly increased from 1970 to 1986, before declining through to 1993 and then recovering slightly (Schmechel, 2001). In the Thames, there has been a consistent increase in the number of birds from 5000 in the 1970s to 16000 in 1997/98, despite a simultaneous increase in cockle dredging (Schmechel, 2001). Contrasting to Schmechel (2001) in the Dutch, Wadden Sea international MPA a gradual loss of intertidal resources explained the loss of red knots (*Caldris cantrus islandica*) from the local populations and a decline in the EU wintering population (van Gils *et al.* 2006). Cockle (*Cerastoderma edule*) mechanical dredging led to lower settlement rates of cockles and reduced their quality (ratio of flesh to shell) (van *Gils et al.* 2006).

Stillman *et al*. (2001) used a behaviour-based model to investigate the effects of present-day management regimes of the Exe estuary mussel fishery and Burry Inlet cockle fishery on the survival and numbers of overwintering oystercatchers. Results of the study concluded that at present intensities (2 fishing units in the Exe estuary and 50 fishing units in Burry Inlet) in both fisheries does not cause oystercatcher mortality to be higher than it would be in absence of the activity (Stillman *et al*., 2001). Theoretical changes in management, such as fishing effort, a reduction in the

minimum size of target species and increase in the daily catch quota were shown to have an impact on oystercatcher mortality and population size (Stillman *et al*., 2001). Different fishing methods were investigated as part of the study. The model predicted the use of dredges on either estuary increased the time birds would spent feeding and the use of supplementary feeding areas (Stillman *et al*., 2001). As would be expected, the removal rates of mussels and cockles using mussel dredges and suction dredges were much greater that hand-raking or hand-picking (Stillman *et al*., 2001). Sixty suction dredges could kill all the Burry Inlet oystercatchers (Stillman *et al*., 2001). Hand-raking for mussels however was found to reduce the area of beds, permanently increase interference and disturb birds, temporarily increasing interference, whilst dredging for mussels only decreased bed area (Stillman *et al*., 2001). The varying impacts of different fishing methods reflect differences in the way they deplete shellfish stocks (Stillman *et al*., 2001).

Size of prey species

The exact role of the fishery and its effect on bird population, as a result of direct competition, will largely depend on the different size fractions of the stock that may be exploited by fishers and birds (Schmechel, 2001). Whilst there may be an overlap in the size of cockles taken by both fishers and birds, most bird predation is of a smaller size class than fishers take (Norris *et al*., 1998). If sizes overlap there can be a genuine conflict of interest between the birds and the fishery, therefore larger minimum sizes are therefore more favourable to birds (Lambeck *et al*., 1996). Oystercatchers have shown a preference for older cockles, 20 to 40 mm, and will not take cockles less than 10 mm when these larger size classes are available (Hulscher, 1982; Zwarts *et al*., 1996a). On the other hand, oystercatchers do not necessarily choose the largest cockles as they are difficult to handle, with studies reporting that larger cockles were refused more often than small ones (Zwarts *et al*. 1996a). Oystercatchers are known to refuse small prey due to low profitability and the size of cockles left after fishing may therefore have an impact on feeding rate of the oystercatcher (Zwarts *et al*. 1996b; Wheeler *et al*., 2014).

Caldow *et al*. (in Jensen *et al.* 2005) demonstrated, the main target species of pump-scooping dredging, the non-native Manila clam, forms a prey item of the oystercatcher population in Poole Harbour. In the study, it is speculated the fishery, which reduces abundance, maximum age and size of Manila clam, may suppress potential benefits to the oystercatcher population. Between late summer and the following spring, a significant increase in the proportion of the population (up to 40 to 50%) consumes this target species. Using an individuals-based simulation model, the study predicts the presence of Manila clams in the Harbour, at low densities of 5 clams per m^2 (mean density when the study was undertaken), has reduced over-winter mortality rates of oystercatchers by 3.5%. The size of individuals targeted by oystercatchers range in length from 16 to 50 mm, which overlaps to some extent with the fishery, where individuals 35 mm and above are removed. As such, there will be some level of direct competition between the two.

6.2.4 Removal of non-target species

Fishing activity can have indirect impact upon birds by affecting the availability of prey through pathways that do not include targeted removal (Natural England, 2014). In general, bottom towed fishing gear has been shown to reduce biomass, production and species richness and diversity of benthic communities where fishing activities take place (Veale *et al*., 2000; Hiddink *et al*., 2003). Alterations in the size structure of populations and community are also known to occur (Roberts *et al*., 2010). When dredges are towed along the seafloor, surface dwelling organisms can be removed; crushed, buried or exposed and sessile organisms will be removed from the substrate surface (Mercaldo-Allen & Goldberg, 2011). Direct burial or smothering of infaunal and epifaunal organisms is possible due to enhanced sedimentation rates (Mercaldo-Allen & Goldberg, 2011). In a meta-analysis of 39 studies investigating the effects of bottom towed gear, there was an overall reduction of 46% in the abundance of individuals within disturbed (fished) plots (Collie *et al*., 2000). In a separate meta-analysis of 38 studies, investigating the impacts of intertidal harvesting on benthic invertebrate communities, which represent bird prey sources, harvesting was shown to cause a significant reduction of 42% in the average abundance across all taxa in the first 10 days following disturbance (Clarke *et al*., 2017). A simultaneous increase in species diversity of 39% was reported in the first 10 days following disturbance, however this was followed by a significant reduction in diversity 51-500 days post-fishing and no significant effect after >500 days (Clarke *et al*., 2017). The magnitude of the response of fauna to bottom towed fishing gear varied with gear type, habitat (including sediment type) and among taxa (Collie *et al*., 2000).

In a study by Ferns *et al*. (2000), bird feed activity increased shortly after the mechanical harvesting of cockles using a tractor, particularly in areas of muddy sand rather than in areas of clean sand. Gulls and waders took advantage of the invertebrates made available by harvesting. For example, 80 dunlins and seven curlews were observed feeding on harvested areas 6 days after harvesting. Following this increase, the level of bird activity declined in areas of muddy sand when compared with control areas and become particularly apparent 21 and 45 days after harvest (Figure 13). Levels of bird activity remained significantly lower in curlews and gulls for more than 80 days after harvesting and in oystercatchers for more than 50 days. Any initial net benefit of harvesting was matched by decreased feeding opportunities in the winter. Harvesting large areas however would not result in a neutral effect, firstly as the bird population would not be large enough to fully exploit the enhanced feeding opportunities and secondly the subsequent reduction in feeding opportunities would extend over a longer period of time (Ferns *et al*., 2000). Other effects would include the migration of birds into unharvested areas which would then lead to increased bird densities in these areas (Sutherland & Goss-Custard 1991; Goss-Custard 1993).

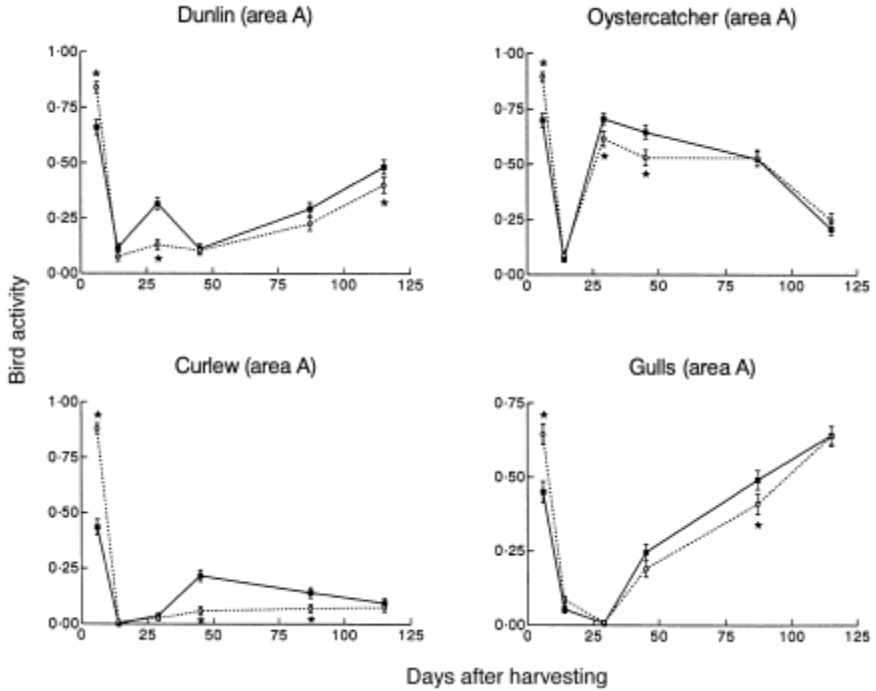

Figure 13. Mean proportion (±SD) of samples in control (black squares) and harvested (white circles) sectors containing footprints of different bird species. Significant differences between sectors are indicated by an asterisk and estimated by bootstrapping. Source: Ferns *et al*., 2000

The relative impact of shellfish dredging on benthic organisms, which form potential prey items, is species-specific and largely related to their biological characteristics and physical habitat (Mercaldo-Allen & Goldberg, 2011). The vulnerability of an organism is ultimately related to whether or not it is infaunal or epifaunal, modile or sessile and soft-bodied or hard-shelled (Mercaldo-Allen & Goldberg, 2011). Epifauna, organisms inhabiting the seabed surface, are subject to crushing or at risk of being buried, in addition to effects of smothering, whilst infauna, organisms living within sediment, may be excavated and exposed (Mercaldo-Allen & Goldberg, 2011). A number of studies have found soft-bodied, deposit feeding crustaceans, polychaetes and ophiuroids to be most affected by dredging activities (Constantino *et al*., 2009). This is supported by a meta-analysis conducted by Collie *et al*. (2000) who predicted a reduction of 93% for anthozoa, malacostraca, ophiuroidea and polychaete after chronic exposure to dredging. This is further supported by another meta-analysis conducted by Clarke *et al*. (2017) which reported the most severe decline in the taxonomic group annelida (39.17%), followed by mollusca (33.76%) and crustacea (29.61%) in the first 10 days following disturbance from intertidal harvesting. Furthermore, a study looking at the effects of mechanical cockle harvesting in intertidal plots of muddy sand and clean sand, found that annelids declined by 74% in intertidal muddy sand and 32% in clean sand and molluscs declined by 55%in intertidal muddy sand and 45% in clean sand (Ferns *et al*., 2000). Similar results were reported by EMU (1992), who found a distinct reduction in polychaetes, but less distinct difference in bivalves, after dredging had taken place and between dredged and control samples. This corresponds with analysis completed by Collie *et al*.

(2000) who reported that bivalves appeared to less sensitive to fishing disturbance than anthozoa, malacostraca, ophiuroidea, holothuroidea, maxillopoda, polychaeta, gastropoda and echinoidea,

A number of studies have highlighted species that are particularly vulnerable to dredging as well as those which appear to be more tolerant. For example, the polychaete *Lanice conchilega* are highly incapable of movement in response to disturbance and therefore take a significant period of time to recolonise disturbed habitats (Goss-Custard, 1977). Deep burrowing molluscs, such as *Macoma balthica*, also have limited capability to escape. Following suction dredging for the common cockle on intertidal sand, the abundance of *Macoma* declined for 8 years from 1989 to 1996 (Piersma *et al*., 2001). Ferns *et al*. (2000) reported reductions of 30% in the abundance of *Lanica conchilega* in intertidal muddy sand after mechanical cockle harvesting (using a tractor) took place, although abundances of *Macoma balthica* increased. The same study also revealed large reductions of 83% and 52% in the abundance of the polychaete *Pygospio elegans* and *Nephtys hombergii*, respectively (Ferns *et al*., 2000). The former species remained significantly depleted in the area of muddy sand for more than 100 days after harvesting and the latter for more than 50 days (Ferns *et al*., 2000). Other polychaete species also thought to be particularly affected are *Arenicola*, *Scoloplos*, *Heteromastus* and *Glycera* (Collie *et al*., 2000). A meta-analysis of 38 studies investigated the initial impacts (0-10 days post-fishing) of intertidal harvesting on bird prey resources down to a specie-level response. The study reported reductions in all species (23.58% in *Cerastoderma edule*, 16.18% in *Nephtys* spp., 47.25% in *Hydrobia* (*Peringia*) *ulvae*, 48.78% in *Scoloplos* spp), although only significant for *Scoloplos* spp. and except for *Macoma baltica* which increased by 14.09%.

Furthermore, a study by Beukema and Dekker (2018) investigated the effects of cockle (*Cerastoderma edule*) abundance and fishery on bivalve abundance, finding that low adult cockle density led to high cockle recruit density. Low recruit densities were apparent before fishing started indicating that these low densities were a result of the high cockle abundance itself. Recruit numbers, which had not changed post fishing activity were not different between fishing and non-fishing years, nor between fished and unfished areas (Beukema & Dekker, 2018). This study was conducted in relatively muddy sediments a reason suggested for the lack of significant influences of fishery in the studied area.

Site-Specific Studies

A number of studies have specifically investigated the impacts of pump-scoop dredging in Poole Harbour (Parker & Pinn, 2005; Cesar, 2003 in Jensen *et al*., 2005), with the most recent being the most extensive

Jensen *et al*. (2005) reported on the preliminary results of a MSc project looking at potential impact of pump-scoop fishing (for clam species) in Poole Harbour At thirteen sites, three replicate sediment samples were taken before and after the 2002/03 clam fishing season (late October to early January). Preliminary results from four sites, including data from a site experiencing ‘high’ fishing pressure (Seagull Island) were analysed and presented. The results show the infaunal community at Seagull Island to have a qualitatively similar level of disturbance before and after the fishing season, with no significant differences at all four sites before and after the season. Some quantitative changes were observed in the fine sediment granulometry at Seagull Island, however sediment samples from all four sites showed no significant differences before and after the

season. From the preliminary results it was concluded that there was no significant additional disturbance to the infaunal community before and after the 2002/03 season occurred and whilst no statistically significant, changes to sediment granulometry at the site subject to high fishing pressure did occur.

Parker and Pinn (2005) investigated the impacts of pump-scoop dredging (for cockles) on the intertidal sedimentary environment and macro-infaunal community at two sites located within the Whitley Lake area of Poole Harbour. The study area was characterised by sandy mud with some patches of shingly ground occurring close inshore. Samples from each site were collected in April prior to the cockle fishery season (1st May to 31st January) opening, and then again in May, June and July during the season. The results show little change in the sediment particle size distribution on a monthly basis, with no significant differences observed. After three months of dredging, species richness had declined by from 17.2±1.1 to 12.6±0.9 at the first site and 17.0±2.3 to 14.8±2.3 at the second site. Post-hoc tests reveal significant differences between July and all other months. A decline in abundance was also observed, with reductions of 42.3% at the first site and 50.6% at the second site, with post-hoc tests revealing difference differences between April and July. No significant differences were found in infaunal communities between April and May, indicating either low fishing effort or no initial impact of pump-scoop dredging. After three months, significant differences were detected, with changes between June and July potentially attributable to sudden temperature changes, reproduction-induced mortality or disturbance from another source (hand gathering of cockles or bait digging), although also potentially indicative of a chronic effect of pump-scoop dredging. The species characterising the faunal assemblage in April consisted of *Scoloplos armiger*, *Cingula trifasciata* and *Hydrobia* spp., with May and June similar to April, although with the additional of *Arenicola marina*. In July the dominant species characterising faunal assemblage were *Urothoe* spp., *C. trifasciata*, *A. marina* and *Corophium* spp. *S. armiger* abundance showed the most change, with abundance decreasing to zero in July at both sites. Over the duration of the study *Hydrobia* spp. abundance declined at both sites, whilst *Corophium* abundance and *Urothoe* spp. increased and *A. marina* abundance increased at the first site and remained constant at the second site. It was noted by authors that two species commonly cited as important prey species for bird populations, *Arenicola marina* and *Corophium* spp., did not observe any obvious reductions in response to pump-scoop dredging and as such dredging may not have an obvious adverse impact on bird populations through impacts on the infaunal community.

Clarke *et al*., (2018) used a Before-After-Control-Impact (BACI) sampling design to assess the impacts of pump-scoop dredging on the benthic physical characteristics and community structure. Core samples were taken from separate areas representing different levels of dredging intensity: an area that has historically been intensively dredged and remains open for a seven-month season; an area that has historically been closed to dredging but will be opened for a four-month season and an area that remains permanently closed to dredging (control site). The samples were taken in June, prior to the start of the fishing season in 2015 and November, before the end of the season.

Organic content and the proportion of fine sediments decreased in all sites throughout the study period, with the greatest declines in the intensively dredged site. Statistical analyses showed a significant effect with respect to site, with post-hoc tests revealing significantly less organic content at the intensively dredged site than the newly dredged and control sites, which showed no difference. However, the interaction term between time and site, which would indicate an overall impact of dredging activity in terms of relative change, appeared non-significant, thus indicating a small effect of dredging on the fine sediment content and very slight effect on organic content throughout the study period. The lower level of organic

content and volume of fine sediments may be reflective of the higher fishing intensity or a more dynamic environment dominated by coarser sediments.

Throughout the study period significant changes in community structure occurred in both dredged sites, with statistical analyses showing a significant effect of both site and time before and after fishing, indicating a variation in the magnitude of change in overall assemblage between sites. The overall community structure of the newly dredged site shifted during the study period from those resembling the control site to those at the intensively dredged site. The community structure of the intensively dredged site and to some extent that of the newly dredged site in November, were characterised by high abundances of polychaete worms, in particular *Hediste diversicolor*, *Aphelochaeta marioni*, *Streblospio shrubsolii* and *Tubificoides* spp.; with the former three species showing notable increases in the newly dredged site (Figure 14). Densities of *H. diversicolor* more than doubled in the newly dredged site and were largely dominated by smaller (<10mm) individuals. Control sites were largely dominated by *Peringia ulvae* and *Abra tenuis*, which declined at both dredged sites and also had a general absence of *A. marioni*. *A. tenuis* represents a key prey item for molluscivorous shorebirds. Throughout the study period, densities of all species at the control site were generally much lower but more stable than at both dredged sites, at which the magnitude of change was much larger. Across both months, species richness was also found to be significantly higher in both dredged site compared to the control site. Biotic indices indicate all sites to be classed as ‘moderately disturbed’, with the control site and newly dredged site classified as ‘good’ quality and the intensively dredged site classified as ‘moderate’ quality. Despite the significant changes in community structure in the newly dredged site, as described above, no change in the biotope or ecological quality of either of the dredged sites were identified. It is worth noting that prior to the opening of the fishing season statistical analyses showed site differences in community structure, likely to be driven by a gradient in sediment type. Throughout the study period there were also clear seasonal changes in species abundance. The BACI sampling design allows for assessment of seasonally-induced changes however, and the greatest changes in community structure were observed in the newly dredged site with significant increases in species richness and total abundance.

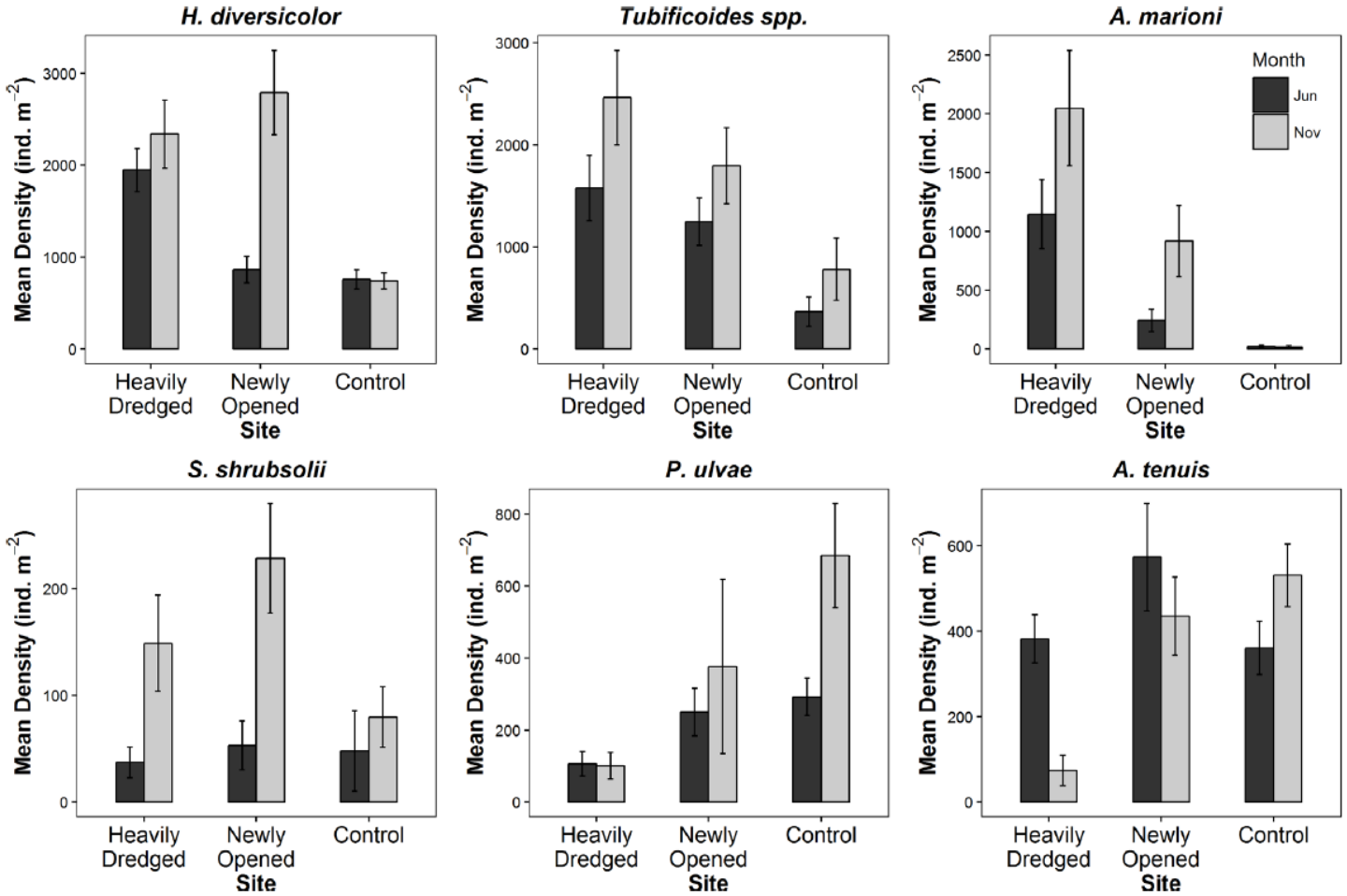

Figure 14. Mean densities of common species in June (dark grey) and November (light grey) 2015 at three sites representing different levels of pump-scoop dredging intensity (heavily dredged, newly opened, control) in Poole Harbour. Heavily dredged; an area that has historically been intensively dredged and remains open for a seven-month season (May 25th-December 23rd). Newly dredged; an area that has historically been closed to dredging but will be opened for a four-month season (1st July-31st October). Control site; an area that remains permanently closed to dredging (control site). Source: Clarke *et al*., 2018.

Recovery

The timescale of recovery for benthic communities and potential prey species largely depends on sediment type, associated fauna and the rate of natural disturbance (Roberts *et al*., 2010). In locations where natural disturbance levels are high, the associated fauna are characterised by species adapted to withstand and recover from disturbance (Collie *et al*., 2000; Roberts *et al*., 2010). More stable habitats, which are often distinguished by high diversity and epifauna, are likely to take a greater time to recover (Roberts *et al*., 2010). The recovery for gravel habitats has been predicted to be in the order of ten years (Collie *et al*., 2005). This was reported by recovery rates observed during a 10-year monitoring program of a gravel habitat located close to the Isle of Man following closure of the area to scallop dredging (Bradshaw *et al*., 2000). Similar recovery periods were estimated for muddy sands, which Kaiser *et al*. (2006) estimated to take years after finding the sediment type was particularly vulnerable to impacts of fishing activities. The recovery periods for sandy habitats is estimated to take days to months (Kaiser *et al*., 2006). In the meta-analysis conducted by Kaiser *et al*. (2006), a significant linear regression with time for the response of annelids to the impacts of intertidal dredging in sand and muddy sand habitats was reported. Annelids were predicted to have recovered after 98 days post fishing in sand habitats and 1210 days in muddy sand habitats (Kaiser *et al*., 2006). Authors stated recovery for the latter however should be treated with caution (Kaiser *et al*., 2006).

Population recovery rates are known to be species specific (Roberts *et al*., 2010). Long-lived bivalves will undoubtedly take longer to recovery from disturbance than other species (Roberts *et al*., 2010). Megafaunal species such as molluscs and shrimp over 10 mm in size, especially sessile species, are more vulnerable to impacts of fishing gear than macrofaunal species as a result of their slower growth and therefore are likely to have long recovery periods (Roberts *et al*., 2010). Short-lived and small benthic organisms on the other hand have rapid generation times, high fecundities and therefore excellent recolonization capacities (Coen, 1995). For example, slow-growing large biomass biota such as sponges and soft corals are estimated to take up to 8 years, whilst biota with short life-spans such as polychaetes are estimated to take less than a year (Kaiser *et al*., 2006).

In a meta-analysis of 38 studies, investigating the recovery of invertebrate communities from intertidal harvesting, the recovery of non-target species (of the fishery) did not appear more than 500 days following disturbance across all habitat types, with a further reduction in abundance occurring at this time (Clarke *et al*., 2017). When broken down by habitat type, some habitats may demonstrate a trend towards recovery at 51-500 days (Clarke *et al*., 2017). Recovery trends for the majority of gear-habitat combinations were shown to be are unstable and highly variable. The recovery for hydraulic dredging in mud habitats show relatively short-term impacts with respect to abundance, with reductions in the first 10 days following disturbance, and close to no effect thereafter. The recovery of from mechanical dredging in mud differs between phyla with a decline in mollusc abundance suppressed for >60 days post-fishing, but positive trend in other phyla (annelids, crustaceans), demonstrating near recovery over the same period. Recovery in may is variable with clear trends towards recovery only evidence for hydraulic and mechanical dredging. The recovery for mechanical dredging in sand indicates a positive trend, with partial recovery after 400 days.

Studies on recovery rate

There are a limited number of studies which examine the recovery rate from biological and physical disturbance caused by shellfish dredging. Five studies were found on the impacts of shellfish harvesting on intertidal habitats, four of which are based in the UK (details are provided in Annex 9). The recovery rates reported range from no effect (thus no recovery is required) up to 12 months, with intermediate recovery rates reported at 56 days and 7 months (Kaiser *et al*., 1996; Hall & Harding, 1997). Spencer *et al*. (1998) reported a recovery rate of up to 12 months, although inferred it was not possible to be certain recovery had not occurred before this as not all treatment replicates were taken 4 and 8 months after sampling. The authors compared their findings with similar studies and speculated the greater length of recovery in comparison was related to the protected nature of the site (Spencer *et al*. 1998). This study highlights the importance of exposure in determining recovery rates of different habitats and also how recovery rates are site-specific.

Species-specific diets

While shorebirds will typically eat a range of different prey species such as molluscs and annelids, the type of preferred prey species will vary between bird species (Natural England, 2014). It is important to knowledge these variations in prey preference as the impacts of dredging on bird species are likely to be reflective vary depending on the vulnerability of prey species to impacts of dredging. The plasticity of a bird's diet will also vary depending on the species and it is important to consider alternate prey species as bird will not be restricted to one source of food. Table 5 provides details of prey items taken by designated bird species within the Poole Harbour SPA. For example, oystercatchers will prey upon small cockles, Baltic tellins, soft-shell clams, lug-worms and ragworms (Wheeler *et al*., 2014). Some prey items may be of low value to the birds and not a major component of their diet (Zwarts *et al*. 1996ab; Atkinson *et al*. 2003). Alternative prey sources may also be less available as organisms may bury deeper into the sediment and thus require the birds to expend a greater amount of energy (Zwarts *et al*. 1996ab). Birds may directly compete with the fishery if both target the same species. The key bird species at risk from changes in prey availability are non-breeding overwintering species as food requirements are considerably greater during winter due to thermoregulatory needs and metabolic costs (Wheeler *et al*., 2014).

Table 5. Typical prey items known to be taken by designated bird species in Poole Harbour SPA. Information on general prey preference was obtained from the SPA Tool Kit and Natural England's Poole Harbour Conservation Advice Package. Specific information on prey species was taken from the draft supplementary advice on conserving and restoring site features and also from other conservation advice packages from nearby SPAs with the same bird features.

Common Name	Latin Name	General Prey Preference	Prey Species
Avocet	*Recurvirostra avosetta*	Fish, molluscs, crustaceans, insects, worms	*Gammarus, Corophium, Nereis, Hydrobia, Cardum,* gobie spp.
Little egret	*Egretta garzetta*	Fish, amphibians, insects	

Eurasian spoonbill	*Platalea leucorodia*	Insects, small fish, crustaceans, frogs and tadpoles, worms, leeches	
Black-tailed godwit	*Limosa limosa islandica*	Insects, worms, plants/grasses/seeds	*Scrobicularia, Macoma, Hediste, Arenicola, Cardium, Nereis*
Shelduck	*Tadorna tadorna*	Molluscs, crustaceans, worms, insects	*Hydrobia ulvae, Macoma, Corophium, Hediste, Enteromorpha, Nereis*
Dunlin	*Calidris alpina*	Molluscs, insects, worms	*Macoma, Hydrobia* spp., *Nereis, Crangon, Carcinus, Scrobicularia, Corophium, Hediste*
Dark-bellied brent goose	*Branta bernicla bernicla*	Plants/grasses/seeds	*Zostera* spp., *Enteromorpha, Ulva lactuca*
Goldeneye	*Bucephala clangula*	Fish, molluscs, crustaceans, insects	
Teal	*Anas crecca*	Plants/grasses/seeds	*Enteromorpha* spp., *Ulvae* spp.
Curlew	*Numenius arquata*	Molluscs, crustaceans, insects, worms	*Mya, Cerastoderma, Scrobicularia, Macoma, Hediste, Arenicola, Carcinus*
Red-breasted merganser	*Mergus serrator*	Fish	Gobies, flatfish, herring fry (<11cm), shrimp, sticklebacks, *Nereis* spp.
Spotted redshank	*Tringa erythropus*	Insects, worms	
Greenshank	*Tringa nebularia*	Fish, crustaceans, worms	
Redshank	*Tringa totanus*	Molluscs, crustaceans, insects, worms	*Mya, Scrobicularia, Macoma, Hydrobia, Corophium, Hediste, Nereis*
Pochard	*Aythya farina*	Fish, insects, plants/grasses/seeds	

Additional information was also obtained from Durrell & Kelly (1990), Cox *et al*. (2014), European Commission (2009), Brearey (1982) & Clarke *et al*., (2017) (Supplement 1)

6.3 Site-Specific Seasonality Table

Table 6 below indicates (highlighted in grey) when significant numbers of each mobile designated feature are most likely to be present at the site during a typical calendar year. Where count data was available, highlighted months with significant numbers were defined on the basis of one or both of the following criteria being met in more than three-fifths (60%) of the years within the six years period 2007-2012. The two criteria used were: i) monthly maxima exceed 10% of the highest mean of monthly maxima over the six-year period; ii) monthly maxima exceed the 2012/2013 national significance threshold. These criteria were predominantly used for non-breeding bird features (based on WeBS data). Where insufficient count data were available to use these criteria, months with significant numbers were highlighted on the basis of generic information on seasonal patterns of occurrence in published sources. The data has been taken from NE Advice on Seasonality for Poole Harbour SPA, last updated 13th March 2020.

Table 6. Presence by month of mobile designated features at the Poole Harbour SPA. Grey indicates periods of presence in significant numbers whereas blank (white) indicates either periods of absence or presence in less significant numbers but where there may still be a significant effect.

Common Name	Latin Name	Designated Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avocet	*Recurvirostra avosetta*	Nonbreeding; Wintering												
Black-tailed godwit	*Limosa limosa*	Nonbreeding; Wintering												
Common tern	*Sterna hirundo*	Breeding												
Mediterranean gull	*Larus melanocephalus*	Breeding												
Shelduck	*Tadorna tadorna*	Nonbreeding; Wintering												
Little egret	*Egretta garzetta*	Nonbreeding; Wintering												
Sandwich tern	Sterna sandvicensis	Breeding												
Spoonbill	Platalea leucorodia	Non-breeding												

6.4 Site Condition

Natural England provides information on the condition of designated sites and describes the status of interest features.

Under the Habitats Directive, relevant for Special Areas of Conservation (SACs) and Sites of Community Importance (SCIs), the United Kingdom is obliged to report on the Favourable Conservation Status of Annex I and Annex II features every 6 years. There are similar reporting requirements under the Birds Directive, relevant for Special Protection Areas (SPAs). Feature condition influences the Conservation Objectives in that it is used to determine whether a 'maintain' or 'recover' objective is needed to achieve the target level for each attribute.

During 2015-16 Natural England reviewed, refined and tested condition assessment methodology to provide more robust results. Natural England will employ this methodology to start a rolling programme of marine feature condition assessments in 2017-18, which will be conducted by their Area Teams. The condition assessment currently available for Poole Harbour SPA is comprised of an analysis of data collected by the British Trust for Ornithology (BTO) and the condition assessment of Poole Harbour SSSI which was compiled in 2010, with a few of the units having been re assessment in 2018.

6.4.1 Poole Harbour SSSI Condition Assessment

An indication of the condition of site interest features can be inferred, if available, from assessments of SSSIs[11] that underpin the SPA. There are a number of SSSIs which exist within the area covered by Poole Harbour SPA and these, along with relevant feature condition assessments are summarised in Table 7. Note that only SSSI sites where shellfish dredging is known to occur have been chosen. The only update to this table from the previous HRA for this fishery is for Unit 037 where the condition assessment was updated in 2021.

Table 7. Condition assessments of SSSI units within the Poole Harbour SPA.

SSSI Site Name	Habitat	Unit number	Unit Name	Condition	Condition Threat Risk	Comments
Poole Harbour	Littoral Sediment	02	Whitley Lake	Favourable	High	Intertidal mudflat feature – reduction in the biomass of small invertebrates (particularly worms) from 2002-2009, although *Nephtys* had increased. Change may be a result of slightly seasonal differences in sampling or natural variation.

[11] SSSI Condition assessments: http://designatedsites.naturalengland.org.uk/.

						Estuarine feature – no significant algal mat coverage in 2005, so no further samples. Saltmarsh feature – substantial loss, approx. 80%, of marsh since 2004. Some trampling as heavily used site during summer months but no adverse effects apparent, no signs of pollution, appears to be natural change. Aggregation of non-breeding birds, large numbers of feeding and roosting wildfowl although there is some disturbance from activities such as windsurfing and dog walking.
Poole Harbour	Littoral Sediment	15	Ham Common	Favourable	High	Estuarine feature – no significant algal mat coverage in 2005, so no further samples.
Poole Harbour	Fen, Marsh and Swamp – Lowland	31	Holton Mere and Wood Bar Looe	Unfavourable - declining	High	The condition of this unit is based on an assessment of the water environment, saltmarsh, mudflat and reedbed habitats and wintering and breeding birds. Unfavourable status in 2021 resulting from unfavourable assessments for littoral sediment, saltmarsh and some wintering bird features. Whilst several different factors may contribute to the negative trends, one overarching and dominant factor is eutrophication (nutrient enrichment).There are both water quality and biological indicators of a eutrophication problem that is affecting the ecology of littoral sediment, saltmarsh some wintering birds and there is no sign that the problem is reducing. This wintering bird assessment has been made in relation to the interest features of waterfowl and the peak wintering populations of some species. Although the total number of wintering waterfowl has been relatively stable and above 20,000 the composition of this bird assemblage has changed markedly with

						some species showing substantial increases and others significant declines. It is the nature of these changes that leads to the unfavourable assessment as detailed below with the assessment focussing particularly on the nine individual species that are features of this unit (because they mainly depend on intertidal habitat rather than open water and the subtidal - redshank, grey plover, curlew, dunlin, black-tailed godwit, avocet, shelduck, teal, brent goose). Wintering populations of avocet and black-tailed godwit have generally increased in line with national trends but declines have occurred in a suite of the commoner wader species – redshank, grey plover, curlew, dunlin, and lapwing. The littoral sediment feature in this unit is assessed as unfavourable because of the extent of the occurrence of macroalgae on mudflat. A number of environmental factors apart from nitrogen (e.g. temperature, exposure, salinity, phosphorus concentration, light penetration, sediment nutrient re-cycling) can affect the occurrence, abundance and type of macroalgae both during the year and from year to year. Evidence from different aerial photos shows algal mats were widespread on mudflats on this unit in 1997, 2002, 2005, 2008, 2009, 2015, 2016, 2017 and 2018 (not every year has aerial photo coverage; in some years aerial photos show little or no algae in the unit but these were all from spring photos, before significant algal growth commences). Algae in the unit is not ubiquitous on the mudflat but generally in three discreet areas. The saltmarsh feature is assessed as unfavourable because of the rapid erosion rate of the ‘gull islands’ and the more minor reed invasion at Wood Bar.

Poole Harbour	Fen, Marsh and Swamp – Lowland	32	Keysworth Saltings and Shag Looe Head	Favourable	High	Very few changes since 2001.
Poole Harbour	Fen, Marsh and Swamp – Lowland	34	Swineham point	Favourable	No identified Condition Threat	Communities and zonation noted in 2001, still present.
Poole Harbour	Fen, Marsh and Swamp – Lowland	36	Gigger's Island mudflat and Arne Reedbeds	Favourable	High	Intertidal sediment feature – favourable, reduction in the overall biomass of small invertebrates from 2002-2009. Change may be a result of slightly seasonal differences in sampling or natural variation. Estuarine feature – no significant algal mat coverage in 2005, so no further samples.
Poole Harbour	Fen, Marsh and Swamp – Lowland	37	Patchin Point and Arne Bay	Unfavourable – Declining	High	The assessment of the water environment, saltmarsh, mudflat habitats and wintering birds led to area being in unfavourable condition in 2010, deemed to still be the case. A eutrophication problem affecting ecology. Decline in numbers of overwintering shelduck. Concentrations of dissolved inorganic nitrogen, measured in winter, are less than WFD good status across the Harbour as a whole. Nitrogen enrichment encourages growth of opportunistic macroalgae on mudflat and within saltmarsh. Extent, density and biomass of macroalgae puts unit on borderline between WFD Moderate and WFD Good classes based on three years data. Widespread loss of saltmarsh in Poole Harbour has been happening for many year following a previous

						rapid saltmarsh expansion at the beginning of the 20th Century with the introduction of Spartina. Saltmarsh at Arne Bay seems relatively stable compared with the substantial changes seen elsewhere in the Harbour. EA geomatic data (2011-2014) does not reveal any significant saltmarsh changes at this site. Some algae accumulations on the edges. Numbers of shelduck have declined below the indicative level for favourable condition. A steeper decline has been observed at this site than expected from regional and national trends, therefore it is likely that site-specific pressures are contributing at least in part to this decline. Numbers have increased a little since the last WeBs alert but still remain lower than at almost any time since the 1960s. May be linked to reduced food availability due to algal mat occurrence and being more vulnerable to disturbance than other species. Breeding redshank on Arne saltmarshes appear to have remained stable since 1997.
Poole Harbour	Fen, Marsh and Swamp – Lowland	42	Wych Lake	Favourable	High	Saltmarsh feature – favourable. Little change with limited erosion. Some die back of Spartina anglica within the lower marsh, no changes in upper saltmarsh which is in good condition. Surrounding mudflats are largely free of green seaweed. Estuarine feature – favourable. Algal mats recorded in 2009 however no samples over 2kg/m^2, which is the threshold considered to be unfavourable in terms of algal cover.
Poole Harbour	Fen, Marsh	46	Long and Round Island	Favourable	High	Saltmarsh feature – little change between 2002 and 2009 save for a very small retreat on the NE

	and Swamp - Lowland		saltmarsh and mudflat			shorelines of both islands. Aerials from 2009 show significant bare mud areas, mainly in lower marsh, presumably caused by Spartina dieback. Intertidal sediment feature – reduction in the biomass of small worms and overall biomass of invertebrate, including a reduction in *Corophium* (an important prey item for avocet). Change may be a result of slightly seasonal differences in sampling or natural variation.
Poole Harbour	Fen, Marsh and Swamp – Lowland	47	Ower Bay and Fitzworth	Unfavourable - declining	High	There are both water quality and biological indicators of a eutrophication (nutrient enrichment) problem that is affecting the ecology. Monitoring shows no evidence that the problem is reducing. The nitrate-nitrogen load reaching the Harbour from its catchment is continuing to increase but more slowly in recent years. Erosion of saltmarsh is also evident, and numbers of wintering shelduck in the Harbour have declined significantly in recent years. Current measures to address these matters are not adequate to achieve favourable condition. Elevated levels of nitrogen enrichment encourage macroalgae growth on mudflat and saltmarsh. Green algal mats were widespread in 2016 and 2017. Algal species present dense impenetrable mats. Research indicates macroalgae can cause adverse effects on mudflat invertebrates and wintering birds, as well as saltmarsh by increasing its susceptibility to erosion. The nitrate-nitrogen load continues to increase but more slowly in recent years.
Poole Harbour	Fen, Marsh and Swamp – Lowland	52	Newton Bay	Unfavourable – declining	High	There are both water quality and biological indicators of a eutrophication (nutrient enrichment) problem that is affecting the ecology. Monitoring shows no evidence that the problem is reducing. Erosion of saltmarsh is also evident, and numbers of wintering

						shelduck in the Harbour have declined significantly in recent years. Current measures to address these matters are not adequate to achieve favourable condition. Intertidal sediment feature – comparison of 2002 and 2009 data from the biomass of small worms to have reduced and the overall biomass of invertebrates has decreased, including a reduction in the number of Corophium (an important prey item for Avocet). This could be due to slightly different seasonal difference in sampling or a result of natural variation. The AZTI Marine Biotic Index for the invertebrate community also indicated the site to be a 'heavily disturbed site'. Further investigation is required.
Poole Harbour	Littoral rock	63, 53	Brands Bay north; Inner Brand's Bay and Drove Island	Unfavourable - declining	High	See Unit 64
Poole Harbour	Littoral sediment	64	Brands Bay east	Unfavourable - declining	High	Condition of the Brands Bay Unit (also the same for units 53 and 63) is based on an assessment of the water environment, the saltmarsh, the mudflat habitats and wintering birds. A number of factors indicate an unfavourable condition. There are both water quality and biological indicators of a eutrophication problem that is affecting ecology. Monitoring shows no evidence that the problem is reducing. Erosion of saltmarsh is also evident. Numbers of wintering shelduck in the Harbour have declined significantly in recent years. Current measures to address these matters are not adequate to achieve favourable condition.

						Nitrogen enrichment encourages growth of opportunistic macroalgae on mudflat and within saltmarsh. Extent, density and biomass of macroalgae puts unit in WFD Moderate status based on 4 years of data. Green algal mats were widespread on mudflats in Brands Bay in 2016 and 2017. In most years macroalgae has a presence in this part of the Harbour at less than WFD Good class and the tubular or filamentous fronds of the algal species (Ulva compressa and intestinalis) dominant in Brands Bay form dense impenetrable mats. Research in Poole Harbour (including Brands Bay) on mudflat invertebrates and wintering birds indicates that macroalgae cause adverse biological effects. The nitrate-nitrogen load reaching the Harbour from its catchment is continuing to increase but more slowly in recent years. Further measures are required to tackle these issues and achieve a substantial decline in the nitrogen load and possibly also phosphorus. Extent of saltmarsh has been assessed using both a direct comparison of aerial photos and an EA saltmarsh geomatic data comparison (2011 and 2014) itself derived from aerial photos. Interpretation of aerial photos has been ground truthed on selected units. Substantial loss of saltmarsh vegetation has occurred within most of the Brands Bay saltmarshes. However, the timing and pattern of loss is very different from that within the Holes Bay units assessed earlier this year. In Brands Bay, most of the changes seem to have occurred between 1972 and 1997 with the situation relatively stable subsequently. These changes contribute to unfavourable condition and a number of factors are undoubtedly involved. Algal

						mats dislodged from mudflat are deposited on saltmarsh by high tides, smothering saltmarsh vegetation. Smothering of saltmarsh vegetation by dead algal mats at the edges of the marsh also appears locally to be a factor in their retreat. High levels of nitrogen have been shown elsewhere to increase the susceptibility of saltmarsh to erosion, both because of effects on root growth (root biomass being smaller) and the stability of the mud itself. Sea level rise may also be a factor. Spartina dieback has been noted before at the back of marshes where anaerobic conditions cause the death of rhizomes due to lack of oxygen, but in Brands Bay the main effect has been on the lower saltmarsh. Numbers of shelduck have declined below the indicative level for favourable condition. A steeper decline has been observed at this site than expected from regional and national trends, therefore it is likely that site-specific pressures are contributing at least in part to this decline. Numbers have increased a little since the last WeBs alert but still remain lower than at almost any time since the 1960s. May be linked to reduced food availability due to algal mat occurrence and being more vulnerable to disturbance than other species. Data in Brands Bay itself is incomplete so does not allow a robust assessment of local changes but indicates that that numbers may have held up better in Brands Bay than in the Harbour as a whole.
Poole Harbour	Littoral sediment	65	Poole Harbour channels and open water	Unfavourable – declining	No identified Condition Threat	The overall condition of this unit, the unit covering the entire sub-tidal area of Poole Harbour, is based on an evaluation of the condition of different ecological attributes of the estuary as well as the overall health of the bird population and the condition of the

						nationally important bird species primarily dependent on this sub-tidal environment. The Harbour shows a number of water quality and biological indicators of a eutrophication problem that is affect the ecology of a number of features that are critical components of the estuary. These include the littoral sediment, saltmarsh and the benthic flora and fauna. The assessment of the estuary feature for this unit concentrates on the sub-tidal sub features of the estuary. In summary the weight of evidence indicated the estuary is in unfavourable declining condition because the trends causing the deterioration in condition are continuing. Dense mats of opportunistic macroalgae now occur on mudflat and within saltmarsh but macroalgae are also found sub-tidally. In 2003 a survey found that large quantities of the green macroalgae Ulva rigida had colonised across much of the sub-tidal channel system within the harbour, having previously, in the early to mid-1980s, only been found in quantity in the channel in the south of the outer harbour. Despite the high DAIN concentrations phytoplankton abundance has been assessed at WFD Good status harbour-wide. Nevertheless, the composition of the phytoplankton had fundamentally changed since the 1990s with diatom species characteristic of high nutrient conditions replacing those typical of lower nutrient conditions. This was one indication of a sharp decline in water quality; another was a decrease in water clarity since c2000 a finding backed up by EA data showing an increase in turbidity since the early 2000s. A survey of eelgrass beds showed signs of moderate ephipyte loads and wasting disease coverage and the

						recent literature review indicated that this can be a result of high nutrient pressures. Modelling has shown that there are suitable habitats for subtidal eelgrass Zostera marina restoration across the whole of Poole Harbour. However, the nitrogen loading and concentrations in the wider harbour are well above the level where submerged aquatic vegetation such as Zostera species is typically lost from estuaries. The waterbird assemblage feature is unfavourable for not meeting SPA conservation objectives in a number of respects, primarily declines in a number of different species not explained by national trends, changes in the composition of the wintering population, species declines resulting in several species no longer meeting thresholds for international and national importance and declines in some of the more common species. A number of these changes have been linked to eutrophication effects. Red-breasted Merganser - have suffered a 46% decline since the late 1980s and the latest 5 year mean peak (207) is well below the indicative level for favourable condition (302). There are further indications from comparison of trends in Poole Harbour with national and regional ones that site specific factors are at least partly responsible for this decline. Numbers in Poole Harbour have been declining since the early 2000s after peaking in the late 1990s. Although the national trend has also been a decline the Poole Harbour one has been more severe; in the reference period in the late 1980s Poole harbour averaged 9.7% of the GB population. In the last 5 years this average was 7.2%. Since the two most populous merganser sites in the SW are close together (Poole Harbour and the Fleet and Wey)

						evaluation of trends against regional ones is more instructive than for other species (where the Severn estuary dominates regional numbers). Here Poole Harbour's contribution to regional numbers has fallen from an average of 78.7% in the late 1980s to 52.9% in the last 5 years. Poole is one of several sites along this stretch of the Channel coast between Pagham Harbour and Chesil and the Fleet (including the Isle of Wight; Chichester, Langstone and Portsmouth Harbours, Poole Harbour and the Fleet/Wey are the most important sites) which together hold over 900 birds, about a third of the GB wintering population. Taken together the population is over the threshold for international importance (860). However, the other sites in this cluster have not suffered declines to the same extent as Poole; numbers at Chichester and Langstone have been stable since the late 1980s although there has been a decline in the last 2 years. These observations indicate that mergansers in Poole Harbour are faring significantly worse than in nearby sites, both to the east and west. In turn this strongly suggests that adverse factors specific to Poole Harbour are involved. Goldeneye - have suffered a 43% decline since the late 1980s and the latest 5 year mean peak (79) is below the indicative level for favourable condition (109). Wintering goldeneye populations in the harbour have suffered a sharp decline since peaks in the late 1990s. The increases before then and this subsequent decline are broadly similar to national trends but the Poole Harbour decline is greater. Poole Harbour is the most important site for goldeneye in the area. It contributes up to 70 or 80% of the regional population. The Solent sites to the east support only

						low numbers so, unlike with mergansers, there are no nearby sites that give a good comparison. Nevertheless these observations indicate that there are site specific issues affecting wintering goldeneye in Poole Harbour. Aggregations of breeding birds – Sandwich tern, numbers have been stable or increasing. Common tern, numbers have been stable. Brent goose, numbers have increase by some 142% since the late 1980s an increase greater than the national trend. Teal, numbers have increased greatly; there are now over 3x as many wintering teal as there were in the late 1980s an increase greater than the national trend. Pintail, in the long term, numbers are broadly following national trends. Cormorant, numbers have increased by 74% since the late 1980s.

Overall, the SSSI condition assessment shows that there are units in favourable condition and there are units where the condition is noted to be declining. The unfavourable condition appears to be primarily caused by eutrophication and resulting significant algal mat cover, there are also some concerns noted with regard to certain bird species comprising the waterbird assemblage where populations are declining, and the decline cannot be explained by national trends. A number of the changes to the waterbird assemblage have been linked to the eutrophication effects. A number of units considered to be in favourable condition do however note reductions in the overall biomass of small invertebrates (particularly worms) with respect to intertidal sediment communities. Such reductions however do not constitute a reason to classify such units as unfavourable.

Advice from Natural England received prior to the introduction of the PHDP byelaw, outlining the potential impacts of shellfish dredging on the nature conservation features of the Poole Harbour SPA, reiterated the findings of the 2010 SSSI condition assessment:

'The main concern from the assessment is the high inputs of nitrogen into the Harbour and the consequent algal mat growth which is at levels that could impact on bird prey availability and bird foraging behaviour. A further concern is the possible reduction in the abundance and variety of benthic invertebrates with a decline in biomass of some 26% between surveys in 2002 and 2009. This may be due to year-to-year fluctuations in variability and slight differences in the sampling methodology, although the difference is of sufficient magnitude to cause concern.'

6.4.2 Population trends

Population trend data, where available, can be used to identify site-specific pressures. Information on population trends comes from Natural England's Conservation advice packages available here: https://designatedsites.naturalengland.org.uk/. The setting of population abundance targets for the species is derived based on Wetland Bird Survey (WeBS) and JNCC's Seabird Monitoring Programme (SMP) population data. The population trend data is available for 8 species that are qualifying features of the site and the waterbird assemblage, non-breeding. The information is presented in table 8 below.

Table 8. Population abundance targets for the bird species found in the Poole Harbour SPA. Please note all information presented in this table has been taken from Natural England's Conservation Advice Package available at: https://designatedsites.naturalengland.org.uk/. These do not represent condition assessments.

Species	Target	Explanation
Mediterranean gull	Maintain	Since classification in 1999, the number of breeding pairs of Mediterranean gulls in Poole Harbour has increased from 5 pairs to the new baseline of 64 pairs. This count represents a 10-fold increase in numbers since the site was originally classified. The most recent count of 155 pairs in 2018 represents 13% of the latest (2013-2017) GB breeding population estimate of 1200 pairs.
Sandwich Tern	Maintain	The most recent five-year mean (2017-2021) of 154 pairs (classified population was 181), represents 1.1% of the GB breeding population. The number of pairs during the most recent five-year period were 2017 – 140 pairs, 2018 – 110 pairs, 2019 – 241 pairs, 2020 – 220 pairs, 2021 – 57 pairs.
Common Tern	Maintain	When classified in 2000 the site supported 155 pairs, representing over 1% of the British population. When the site was re-classified in 2017, a new baseline for this species was set at 178 pairs. The most recent five-year mean of 174 pairs (2017-2021) represents 1.6% of the GB breeding population (11,000 pairs). The number of nesting pairs of common tern during the recent five-year period were 2017 – 170 pairs, 2018 – 115 pairs, 2019 – 110 pairs, 2020 – 164 pairs, 2021 – 174 pairs.
Little Egret	Maintain	Little egret was added as an over-wintering feature of the Poole Harbour SPA in 2017, due to its presence in the harbour in numbers exceeding qualifying thresholds. At classification, there were 114 individuals (2010-2014), representing 2.5% of the British population. Currently, the Poole Harbour population peak mean is 155 individuals (2015/16-2019/20), representing 2.6% of the British population of 5916 individuals. The most recent WeBS report indicates that Poole Harbour currently ranks as the 12th most important overwintering site in the UK for this species.
Spoonbill	Maintain	Spoonbill was added as an overwintering feature of the Poole Harbour SPA in 2017, due to its presence in the harbour in numbers exceeding qualifying thresholds. At classification, there were 20 individuals (2010-2014), representing 100% of the British population estimate in 2015. Since then, the British population estimate has been revised to a maximum of 198 and so the current five-year peak mean of 54 individuals (2015/16 – 2019/20) represents 27% of the British population. The most recent WeBS report indicates that Poole Harbour currently ranks as the second most important overwintering site in the UK. Counts of over 60 individuals are regularly made around Brownsea lagoon and, as this is a newly colonising species, numbers are expected to increase and then stabilise at a figure in excess of the baseline of 20 individuals.

Shelduck	Restore	When classified in 1999, the site supported 3,569 individuals, then representing 1.2% of the north-west European population. The over-wintering population of Shelduck in Poole Harbour has declined in the years following designation (by 65%) and the site now supports a five-year peak mean of 1,223 individuals, recorded between 2015/16 and 2019/20. As such, the SPA is currently only the 17th most important site for the species in the UK, holding less than 0.40% of the north-west European population. A WeBS Alert has been triggered for this species and suggests that the declines observed may be due to site-specific pressures, as the site trend does not appear to be tracking either the regional or the British trend. There is no available site-specific information about the cause of the decline, although a study in 2010 suggested that food availability for shelduck in Poole Harbour was borderline, and extensive algal mats may be inhibiting effective foraging (Herbert et al., 2010). Studies elsewhere suggest shelduck declines may be linked to reduced food availability as a result of increase in opportunistic algal mat cover possibly leading to a physical inhibition of feeding activity (scything action) in the presence of dense mats of algae. For example, shelduck avoid foraging in areas with dense algal mats. A study of bird disturbance in Poole Harbour in 2012 also found shelduck to be particularly vulnerable to disturbance with the probability of a major flight being higher in this species (together with curlew and oystercatcher) compared to other species.
Avocet	Maintain	When classified in 1999, the SPA supported nationally important numbers of pied avocet (459 individuals) then representing 36% of the GB population. The over-wintering population of pied avocet in Poole Harbour has significantly increased in the years following classification and the site now supports a five-year peak mean of 1,526 individuals (2015/16 and 2019/20). This represents approximately 19% of the latest GB wintering population estimate of 7,969 individuals, ranking as the fourth most important wintering site in the UK.
Black-tailed godwit (Icelandic Race)	Maintain	When classified in 1999, the site supported 1,576 individuals, then representing 2.4% of the Icelandic population. The over-wintering population of black-tailed godwit in Poole Harbour has increased in the years following classification, and the site now supports a five-year peak mean of 3,110 individuals (2015/16 – 2019/20), making it the 7th most important over-wintering sites for species in the UK. This five-year peak mean represents 7.6% of the latest GB over-wintering population estimate of the Icelandic race of this species of just over 40,000 individuals.
Water bird assemblage	Maintain	With little egret and Eurasian spoonbill added as features of the SPA in 2017, they are included within the assemblage, thus deriving the new assemblage baseline total of 25,176. The highest count was 27,798 individuals in 2019/20. Whilst no species have currently been lost from the assemblage, Pochard was present in the assemblage at numbers over 700 at the time of the original classification. The peak count from 2019/20 was two individuals, suggesting that this species has almost disappeared from Poole Harbour and the assemblage. Currently, on the following species occur in the assemblage in nationally important numbers in addition to species which are features of the site; cormorant, teal, red-breasted merganser and greenshank. Shelduck (65%), curlew (43%), redshank (29%), dunlin (62%), red-breasted merganser (51%), goldeneye (63%), pochard (99%) and lapwing (77%) are all recorded as declining in Poole Harbour. Apart from dunlin and red-breasted merganser, the decline is likely due in part to site-specific reasons as the site trend is at variance with regional or national trends.

It is important to note that the time periods of data used to inform conservation advice packages vary and therefore this data may not have captured the effects of fishing activities that have since commenced or altered since publication. The effects of fishing activities may not necessarily be captured in the next population abundance targets due to the time lag between cause and effect. The data presented in the table above is based on the 2022 update to the Poole Harbour SPA Conservation Advice Package which incorporates data from the most recent WeBS report.

6.5 Existing Management

This list details the management measures which also apply in Poole Harbour, in addition to the Poole Harbour Dredge Permit Byelaw:

- **Bottom Towed Fishing Gear 2016** byelaw – prohibits bottom towed fishing gear over sensitive features including seagrass features within the Poole Harbour SPA.
- **Prohibition of Gathering (Sea Fisheries Resources) in Seagrass Beds** byelaw. This prohibits any person from digging for, fishing for or taking any sea fisheries resource in or from the prohibited areas and does not apply to fishing/taking fisheries resources by means of net, rod and line and hook and line. It also does not apply to fishing for/taking sea fisheries resources using a vessel, provided that no part of the vessels hull in contact with the seabed. No person shall carry a rake, spade, fork or any similar tool in prohibited areas.
- **Fishing for Oysters, Mussels and Clams** byelaw states that when fishing for these species only the following methods are used; a) hand picking and b) dredging using a dredge with a rigid framed south so designed to take shellfish only when towed along the sea bed.
- **Poole Harbour Shellfish Hand Gathering** byelaw prohibits persons from fishing for or taking shellfish by hand picking or using a hand rake or similar instrument from 1st November to 31st March in defined areas.
- **Fishing for Cockles** byelaw applies restrictions to the fishing for cockles by hand in Poole Harbour through a seasonal closed season (1st February to 30th April inclusive) and specifications on the methods of collection, specifying hand picking or a rake or other similar instrument with specified size requirements. The dredge specifications under this byelaw do not apply in Poole Harbour as this is regulated under the Poole Harbour Dredge Permit Byelaw. The minimum conservation reference size for cockles is set under this byelaw at 23.8mm, this applies to hand gathering and dredging fishing.
- **Memorandum of Agreement for Bait Digging within Poole Harbour**. Bait diggers are asked to avoid conducting activity within the bird sensitive areas in Poole Harbour between 1st November and 30th March, backfill any holes which are dug and a number of general provisions, including avoiding trampling saltmarsh and reedbeds and carrying torch lights at night which may disturb roosting birds.
- **Poole Harbour Fishery Order 2015** is a Several Order which allows Southern IFCA to lease ground for the purposes of aquaculture and is achieved by granting exclusive rights to individuals to cultivate and harvest shellfish of any kind within designated lease beds. The Order is accompanied by a Management Plan which outlines the extent of the proposed Order (837.8 hectares) and how the area within that extent will be managed, including the positioning and allocation of leased beds and the process criteria and conditions by which access to leased beds is determined. For any leased ground allocated, a number of management measures are apply including a restriction of vessel length, the persons and vessels that can operate and remove shellfish from a leased bed and a requirement that all commercial shellfish species removed are subject to minimum size restrictions, as would be the case for commercial fisheries operating within Poole Harbour.
- **Minimum Conservation Reference Size Byelaw.** Minimum conservation reference sizes listed in the schedules of this byelaw apply to all fishery participants and through the supply chain. A person must not take, retain on board, tranship, land, transport, store, display or offer for sale from a fishery within the District, any fish of shellfish species specified in the schedules which measure less than the minimum conservation reference size specified in the schedule. Any such fish or shellfish must be returned to the sea immediately.

6.6 Table 9: Summary of Impacts

The potential pressures, associated impacts, level of exposure and mitigation measures are summarised in table 9.

Feature	Supporting habitat(s)	Attribute	Target	Potential Pressure(s) and Associated Impacts	Nature and Likelihood of Impacts	Mitigation measures
Avocet Little egret Eurasian spoonbill Black-tailed godwit Shelduck Waterbird assemblage (Non-breeding – winter and//or passage season)	Saltmarsh: Atlantic salt meadows *Spartina* swards	Supporting habitat: extent and distribution of supporting non-breeding habitat;	Restore the extent and distribution of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding).	Natural England raised concerns with respect to potential erosion caused by pump-scoop dredging taking place in close proximity to saltmarsh supporting habitats.	Shellfish dredging occurs in the vicinity of saltmarsh, in particular to Seagull Island. The shallow nature of these areas and pattern of the dredging activity means vessels are likely to be operating at a slow speed in these areas. As stated by Natural England and recognised in the above statement with regards to bait dragging, pump-scoop dredging is unlikely to occur over saltmarsh. This is further supported by a lack of literature on the impacts of towed gear with regards saltmarsh habitats (i.e. Hall *et al*., 2008; Roberts *et al*., 2010).	Shellfish dredging is prohibited between 23rd December and 25th May. Shellfish dredging is excluded all year round from Holes Bay, Lytchett Bay, upper Wych Lake and upper Middlebere Lake. Shellfish dredging is excluded all year round from the closure areas at Green Island and Seagull Island. Temporal closures prohibit shellfish dredging during key sensitive times of the year (1st November-23rd December & 25th May to 30th June) during the fishing season in key feeding and roosting areas for overwintering birds (Wych Lake, Middlebere Lake, Newton Bay, Ower Bay, Keysworth and parts of Arne Bay and Brands Bay). The level of fishing effort is capped through the allocation of a set number permits at a level of maximum of 45 vessels.
Common tern Sandwich tern	Saltmarsh: Atlantic salt meadows	Supporting habitat: extent and distribution of supporting	Maintain the extent, distribution and availability			

Mediterranean gull (Breeding (summer) season)	*Spartina* swards	habitat for the breeding season	of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding)			The Southern IFCA 'Poole Harbour Saltmarsh Code of Practice' (Annex 10) sets out the following provision in order to prevent disturbance to breeding and roosting bird species and promote protection of supporting habitat and apply to any person carrying out dredge fishing activity within Poole Harbour between 25th May and 23rd December: • No person should fish using a dredge within 10 metres of saltmarsh
Avocet Little egret Eurasian spoonbill Black-tailed godwit Shelduck Waterbird assemblage (Non-breeding (winter and/or passage) season) Common tern	All habitats	Supporting habitat: disturbance caused by human activity	Reduce the frequency, duration and / or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Visual disturbance and above-water noise were identified as potential pressures of pump-scoop dredging. A pump-scoop dredge uses a hydraulic pump to power water jets attached to the front edge of the basket dredge. As such, the noise associated with pump-scoop dredging has previously been raised as a concern (Parker & Pinn, 2005). Disturbance can result in displacement when birds are unable to use an area due to the magnitude of disturbance. The effects of disturbance can include a reduction in the survival of displaced individuals and effects on the population size. The movement of birds to less suitable feeding areas can lead to increased densities and interspecific competition. Disturbance can cause birds to	During the 2016/17 and 2017/18 seasons, 43 out of 45 permit entitlements were taken out. In the 2018/19 and 2019/20 seasons 45 permits were taken (one permit was not fished during the 2018/19 season). The number of permit holders fishing per month varies. The average number of active fishers per month was highest in 2018 and 2019 with 43, compared to 33 in 2017 and 2016, and 27 in 2015. Sightings data show shellfish dredging occurs intertidally (at high tide) in distinct and relatively small spatial areas. Activity is largely concentrated in the area of Holton Mete and the Wards, with activity also taking place east of Giggers Island, Arne Bay, Middlebere Lake, Wych Lake, Ower Lake and Brands Bay. Using the co-location analysis, shellfish dredging may have some effect on sites used by avocet, black-tailed godwit,	Shellfish dredging is excluded all year round from Holes Bay, Lytchett Bay, upper Wych Lake and upper Middlebere Lake which represent key feeding and roosting areas for designated bird species. Shellfish dredging is excluded all year round from the closure areas at Green Island and Seagull Island. Temporal closures prohibit shellfish dredging during key sensitive times of the year (1st November to 23rd December & 25th May to 30th June) during the fishing season in key feeding and roosting areas for overwintering birds (Wych Lake, Middlebere Lake, Newton Bay, Ower Bay, Keysworth and parts of Arne Bay and Brands Bay). Shellfish dredging is prohibited between 23rd December and 25th May. This corresponds to the

Mediterranean gull (Breeding (summer) season)				take flight which increase energy demands and reduce food intake with potential consequences for survival and reproduction. The significance of disturbance is likely to depend on the availability of alternative undisturbed areas for birds and the frequency, seasonality and intensity at which shellfish dredging takes place. Responsiveness to disturbance is largely thought to be a species-specific trait.	Mediterranean gull, shelduck, curlew, redshank and greenshank with potentially sensitive sites including outer Wych and Middlebere, Arne Bay, Ower Bay, Newton Bay, Brands Bay, Holtojn Mere and Keysworth. Avocet are present from September to February, black-tailed godwit are present from September to March and Mediterranean gull are present from April to August. Shelduck, curlew, redshank and greenshank are part of the overwintering bird assemblage and as such will be present during the winter months (September – March). The wind-sensitivity farm indicates black-tailed godwits have moderate to low sensitivity and curlew and shelduck have very low sensitivity to offshore wind farm developments. The escape flight distance exhibited by the shelduck has been reported to vary from 126 metres in response to disturbance by researchers to 400 m in response to surfers. The escape flight distance exhibited by redshank has been reported to vary from 92 in response to disturbance by researchers to 260 m in response to people. In a Poole Harbour disturbance study shelduck were highlighted to have a higher probability of major flight. The mitigation measures outlined reduces the likelihood of disturbance through a number of permanently and seasonally closed areas which not only provide areas where no disturbance through pump-scoop dredging can	period of highest disturbance sensitivity due to the cold weather conditions and availability of food resources. The start of the fishing season takes place after the start of the gull breeding season (1st April). Shellfish dredging is only permitted between 06:00 and 18:00 each day and from Monday to Saturday. Disturbance is minimised through the allocation of a set number permits, thus capping fishing effort at a level of maximum of 45 vessels. The Southern IFCA 'Poole Harbour Saltmarsh Code of Practice' (Annex 10) sets out the following provision in order to prevent disturbance to breeding and roosting bird species and promote protection of supporting habitat and apply to any person carrying out dredge fishing activity within Poole Harbour between 25th May and 23rd December: - No person should fish using a dredge within 10 metres of saltmarsh

					occur in the overwintering period, it also provides alternative undisturbed sites for birds. These sites were chosen based on a number of criteria including bird sensitive areas and in areas where declines in some species have been observed. The timing of the fishing season eliminates any disturbance over a large proportion of the overwintering period and beginning of the Mediterranean gull breeding season. Additional protection is afforded for Mediterranean gulls through guidelines set out in the code of practice.	
Avocet Little egret Eurasian spoonbill	Intertidal mud Intertidal mixed sediments Intertidal sand and muddy sand	Supporting habitat: food availability within supporting habitat	Maintain the distribution, abundance and availability of key prey items (e.g. Gammarus, Corophium, flies, beetles, Nereis, Hydrobia, Cardium, gobies) at preferred prey sizes (e.g. fish or worms between 4-15 mm long).	Removal of target and non-target species were identified as potential pressures of pump-scoop dredging. Shellfish dredging can lead to impacts on non-target species through physical disturbance or damage to supporting habitats which in turn can cause changes in community structure, the removal and mortality of non-target organisms through interaction with fishing gear and smothering of prey through increased sedimentation. Generally, bottom towed fishing gear has shown to reduce biomass, production, species richness and diversity communities. In a meta-analysis of 38 studies, intertidal harvesting was shown to cause a reduction in abundance of benthic invertebrates by 42%	During the 2016/17 and 2017/18 seasons, 43 out of 45 permit entitlements were taken out. In the 2018/19 and 2019/20 seasons 45 permits were taken (one permit was not fished during the 2018/19 season). The number of permit holders fishing per month varies. The average number of active fishers per month was highest in 2018 and 2019 with 43, compared to 33 in 2017 and 2016, and 27 in 2015. Sightings data show shellfish dredging occurs intertidally (at high tide) in distinct and relatively small spatial areas. Activity is largely concentrated in the area of Holton Mete and the Wards, with activity also taking place east of Giggers Island, Arne Bay, Middlebere Lake, Wych Lake, Ower Lake and Brands Bay. Using the co-location analysis, shellfish dredging may have some effect on sites used by avocet, black-tailed godwit, Mediterranean gull, shelduck, curlew, redshank and greenshank with	Shellfish dredging is excluded all year round from Holes Bay, Lytchett Bay, upper Wych Lake and upper Middlebere Lake and as such protect key feeding areas for designated bird species. These areas provide alternative undisturbed foraging sites. Shellfish dredging is excluded all year round from the closure areas at Green Island and Seagull Island. Temporal closures prohibit shellfish dredging during key sensitive times of the year (1st November-23rd December & 25th May to 30th June) during the fishing season in key feeding areas for overwintering birds (Wych Lake, Middlebere Lake, Newton Bay, Ower Bay, Keysworth and parts of Arne Bay and Brands Bay). Shellfish dredging is prohibited between 23rd December and 25th
Black-tailed godwit	Intertidal mud Intertidal mixed sediments	Supporting habitat: food availability	Maintain overall prey availability (e.g.			

	Intertidal sand and muddy sand	within the intertidal	Macoma, Cardium, Nereis) at preferred prey sizes.	and 39% reduction in species diversity in the first 10 days following disturbance (Clark *et al*., 2017).	potentially sensitive sites including outer Wych and Middlebere, Arne Bay, Ower Bay, Newton Bay, Brands Bay, Holtojn Mere and Keysworth.	May. This largely overlaps with the overwintering periods for a number of designated bird species. Disturbance to intertidal sediments is minimised through the allocation of a set number permits, thus capping fishing effort at a level of maximum of 45 vessels.
Shelduck	Intertidal mud Intertidal mixed sediments Intertidal sand and muddy sand	Supporting habitat: food availability within the intertidal	Restore availability of key prey species (e.g. especially Hydrobia, but also Nereis, Corophium, hatching midges) at preferred prey sizes.	The relative impact of shellfish dredging on benthic organisms is species-specific and often related to their biological characteristics and physical habitats. A number of studies have found soft-bodied, deposit feeding crustaceans, polychaetes and ophiuroids to be most affected by dredging activities (Collie *et al*., 2000; Constantino *et al*., 2009; Clark *et al*., 2017). Recovery of affected species is largely species-specific, with short-lived and small benthic organisms, such as polychaetes having excellent recolonization capacities (Coen, 1985; Kaiser *et al*., 2006).	Avocet are present from September to February, black-tailed godwit are present from September to March and Mediterranean gull are present from April to August. Shelduck, curlew, redshank and greenshank are part of the overwintering bird assemblage and as such will be present during the winter months (September – March). Using the co-location analysis and information on diet (table 5), the species likely to be sensitive to changes in food availability are black-tailed godwit, shelduck, curlew, redshank and greenshank. Prey preferences exhibited by these species in particular include *Scrobicularia*, *Macoma*, *Hediste* and N*ereis*. A number of studies have reported increases in M*acoma* following disturbance from harvesting (Ferns *et al*., 2000; Clark *et al*., 2017). Studies specific to the impacts of pump-scoop dredging in Poole Harbour report increases in *Hediste diversicolor*, (Clark *et al*.,2018) as well as other species considered as key bird prey items including *Arenicola marina* and *Corophium* spp (Parker & Pinn, 2005). Many small benthic organisms, including crustaceans, polychaetes and molluscs, some of which are listed above, have short generation times and high fecundities, both of which enhance	A number of restrictions are imposed on the gear configuration of the dredge basket including specified bar spacing which allows small invertebrates to pass through the dredge. There is a requirement to sort catch immediately and return all shellfish under minimum size restrictions (as per Southern IFCA byelaws), as well as bycatch, to the water. The Southern IFCA 'Poole Harbour Saltmarsh Code of Practice' (Annex 10) sets out the following provision in order to prevent disturbance to breeding and roosting bird species and promote protection of supporting habitat and apply to any person carrying out dredge fishing activity within Poole Harbour between 25th May and 23rd December: - No person should fish using a dredge within 10 metres of saltmarsh

					their capacity for rapid recolonization (Coen, 1995). In such instances, the effect of shellfish dredging is likely to only be short term. The mitigation measures outlined reduces the likelihood of disturbance through the removal of target and non-target species through a number of permanently and seasonally closed areas which provide a series of foraging and feeding areas where no pump-scoop dredging can occur in the overwintering period (or all year round in a number of sites). These sites were chosen based on a number of criteria including bird sensitive areas, in areas where declines in some species have been observed and where sediment recovery is likely to be slow i.e. low energy sites. The timing of the fishing season eliminates any disturbance of intertidal mudflats over a large proportion of the overwintering period and allows for the recovery of impacted communities over a five-month period.	

7 Conclusion[12]

In order to conclude whether the issuing of permits under the Poole Harbour Dredge Permit byelaw, which will allow up to 45 vessels to undertake pump-scoop dredging (subject to a number of permit conditions), has an effect on the integrity of the Poole Harbour SPA, it is necessary to assess whether the impacts of the permitted activity (pump-scoop dredging) will hinder the site's conservation objectives, namely:

"Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site

The review of research into the impacts of shellfish dredging (detailed in section 6.2) identifies that this activity has the potential to disturb regularly occurring migratory birds and waterfowl species and lead to changes in prey availability. Disturbance can occur visually or through noise. Changes in prey availability mainly relate to the indirect effects of pump-dredging which include interactions with fishing gear through crushing, burial or exposure. It is also noted that there is a potential risk of physical changes to saltmarsh habitat although peer-reviewed research is lacking.
It is therefore recognised that this activity has the potential to lead an adverse effect upon the following SPA attributes:

- Supporting habitat: disturbance caused by human activity
- Supporting habitat: extent and distribution of supporting non-breeding habitat
- Supporting habitat: extent and distribution of supporting habitat for the breeding season
- Supporting habitat: food availability within supporting habitat
- Supporting habitat: food availability within the intertidal

These potential impacts and risks to the integrity of the site are mitigated through a number of conditions applied under the permit which;

- Provides a network of areas where there is little or no noise and visual disturbance and supporting habitat disturbance including; bird sensitive areas, areas where declines in some bird species have been observed that are likely to be in part attributable to site specific pressures, Mediterranean gull nesting sites at Seagull Island, areas where sediment recovery is likely to be slow (low energy sites), fringing saltmarsh, reedbed and lowland water habitats supporting breeding birds. Shellfish dredging is excluded in Lytchett Bay, Holes Bay, and inner regions Wych Lake and Middlebere Lake all year round. Shellfish dredging is also excluded from defined areas at Green Island and

[12] If conclusion of adverse effect alone an in-combination assessment is not required.

Seagull Island all year round. Shellfish dredging is excluded from overwintering, feeding and roosting bird sensitive areas at Wych Lake, Middlebere Lake, Newton Bay, Ower Bay, Keysworth Bay and parts of Arne Bay and Brands Bay during key sensitive times of the year for bird species between 25th May and 1st July, 1st November and 23rd December. The 'Poole Harbour Saltmarsh Code of Practice' provides an extra voluntary provision to reduce disturbance and reduce the risk of impacts to supporting habitats year-round.

- Manage shellfish dredging throughout the Harbour in a way that minimises its impact on prey availability and disturbance, through restrictions in the number of permits (45), the design of the pump and dredge used and restrictions in the timing of when the fishery takes place (closed from 24th December to 24th May). The prohibition on dredge fishing between 23rd December to 25th May mitigates over-wintering bird disturbance during this lean period.
- Allow for an assessment of fishing effort of key commercial species including the Manila clam and common cockle, which are prey items for some of the designated bird species, through the requirement for catch data indicating, for each month, the hours fished, the quantities of species caught, the buyer(s) and the zone from which the catch was taken. This data can be used to indicate trends in fishing activity and can be related to data from the Poole Harbour Bivalve Stock Assessment to ensure that the level of fishing remains sustainable and will not have an adverse impact on prey availability of the commercially harvested species.

Taking into account all the evidence presented in this Appropriate Assessment, including scientific literature, habitat feature data and sightings data, it is concluded that issuing of permits for 2023/24 season under the Poole Harbour Dredge Permit byelaw will not hinder the site from achieving its conservation objectives and as such will not have an adverse effect upon on the integrity of the Poole Harbour SPA. As in previous years (2015/16, 2016/17, 2017/18, 2018/19, 2019/20, 2020/21, 2021/22, 2022/23) it is therefore proposed the number of permits issued should remain at 45. This reflects the current level of effort which is considered to be sustainable. As outlined above, the permit conditions and Code of Practice will continue to mitigate against any potential impacts of the fishery on the bird features and supporting habitats of this site. In addition, required catch reporting will allow catch rates and fishing effort to be monitored. Furthermore, the permit is flexible and Southern IFCA can therefore review the suitability of the permit conditions, attach conditions to the permit and vary or revoke conditions attached to the permit at any time after the permits have been issued, following a set process. As such, any changes will have regard to the Authority's duties and obligations under section 153 and 154 of the Marine and Coastal Access Act 2009, advice from Natural England, new evidence in the form of scientific data or literature and/or any Habitats Regulations Assessment. This flexibility allows proportionate management of the dredge fishery in Poole Harbour whilst achieving the conservation objectives of the site.

8 In-combination assessment

Based on the mitigation measures, in the form of permit conditions, it is concluded that issuing 45 permits under the Poole Harbour Dredge Permit byelaw for the 2023/24 season alone will not have an adverse effect on bird features and their supporting habitats within Poole Harbour SPA.

Under Article 6(3) of the Habitats Directive and outlined in the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019, the assessment of any plan or project likely to have a significant effect on a site within the National Site Network, must be assessed in combination with other plans or projects. Any commercial plan or project require a Habitat Regulations Assessment in their own right and must also account for any in-combination effects with the Poole Harbour Dredge Permit byelaw.

Commercial plans and projects that occur within or that may affect the Poole Harbour SPA are considered in below. The impacts of these plans or projects require a Habitat Regulations Assessment in their own right and must also account for any in-combination effects with the Poole Harbour Dredge Permit byelaw.

Project	Status	In-combination Assessment
Poole Local Plan	Ongoing	Poole Local Plan describes the requirement that Poole District must add at least 14,200 homes between 2013 and 2033. An increase in homes will directly increase the number of people living in the area. As it is well known that those who live close to the sea often take recreational visits to these areas it is likely that this will lead to an increased level of disturbance to protected overwintering birds around Poole Harbour. Therefore, one common impact pathway between this project and the Poole Harbour Dredge Permit of visual disturbance/above water noise is possible. However, through this assessment of the Poole Harbour Permit Dredge Byelaw it is clear that these pressures have been screened out from having an adverse effect on the integrity of the site. Furthermore, each individual housing development will have to undergo a Habitats Regulations Assessment of its own as well as an in-combination assessment with fishing activity to ensure it does not cause adverse effect to the integrity of Poole Harbours MPAs. As these developments are not yet in the planning stages, and are likely to come in the form of many smaller developments over a long period of time, and with the consideration of the permits mitigating factors considered within this HRA it is unlikely that there will be a combination effect between those developments and the Poole Dredge Permit Byelaw.

8.1 Fishing Activity In-combination Assessment

The Poole Harbour Fishery Order 2015	The Poole Harbour Fishery Order 2015 is a several order which sets an area within the Harbour within which the Southern IFCA can lease out areas of seabed for aquaculture. Leases are issued on a five yearly basis and the current leases are for the period 2020-25. The conclusion of the 2020-25 HRA for the issuing of leases under the Order was that the issuing of leases would not have an adverse effect on the integrity of the Poole Harbour SPA. Lease beds under the Order are severed from the public right to fish therefore there is no potential for spatial overlap of the two activities within Poole Harbour. Based on this and the conclusion of both this HRA and the HRA for the issuing of leases under the Order of no adverse effect on the integrity of the SPA it is concluded that there will be no in-combination effect on the integrity of the Poole Harbour SPA from these two fishing activities.
Light otter trawl	Light otter trawls do not interact with the features. At a TSLE level no common pressures between light otter trawl and the Dredge Permit Byelaw were screened in. Therefore, there is unlikely to be any in-combination effect between the two gear types.
Pots/creels	At a TSLE level no common pressures between static gear and the Dredge Permit Byelaw were screened in. Therefore, there is unlikely to be any in-combination effect between the two gear types.
Handlines (rod/gurdy) & Jigging/trolling	At a TSLE level no common pressures between handline/jigging and the Dredge Permit Byelaw were screened in. Therefore, there is unlikely to be any in-combination effect between the two gear types.
Net Fishing	At a TSLE level no common pressures between net fishing and the Dredge Permit Byelaw were screened in. Therefore, there is unlikely to be any in-combination effect between the two gear types.

8. Summary of consultation with Natural England

Date	Contact	Sent	Comments Received

9 Integrity test

Based on the mitigation measures, in the form of permit conditions, it is concluded that the issuing of permits under the Poole Harbour Dredge Permit byelaw for the 2023/24 season will not have an adverse effect, alone or in-combination, on bird features and their supporting habitats within Poole Harbour SPA. As in previous years (2015/16, 2016/17, 2017/18, 2018/19, 2019/20, 2020/21, 2021/22, 2022/23) it is therefore proposed the number of permits issued should remain at 45.

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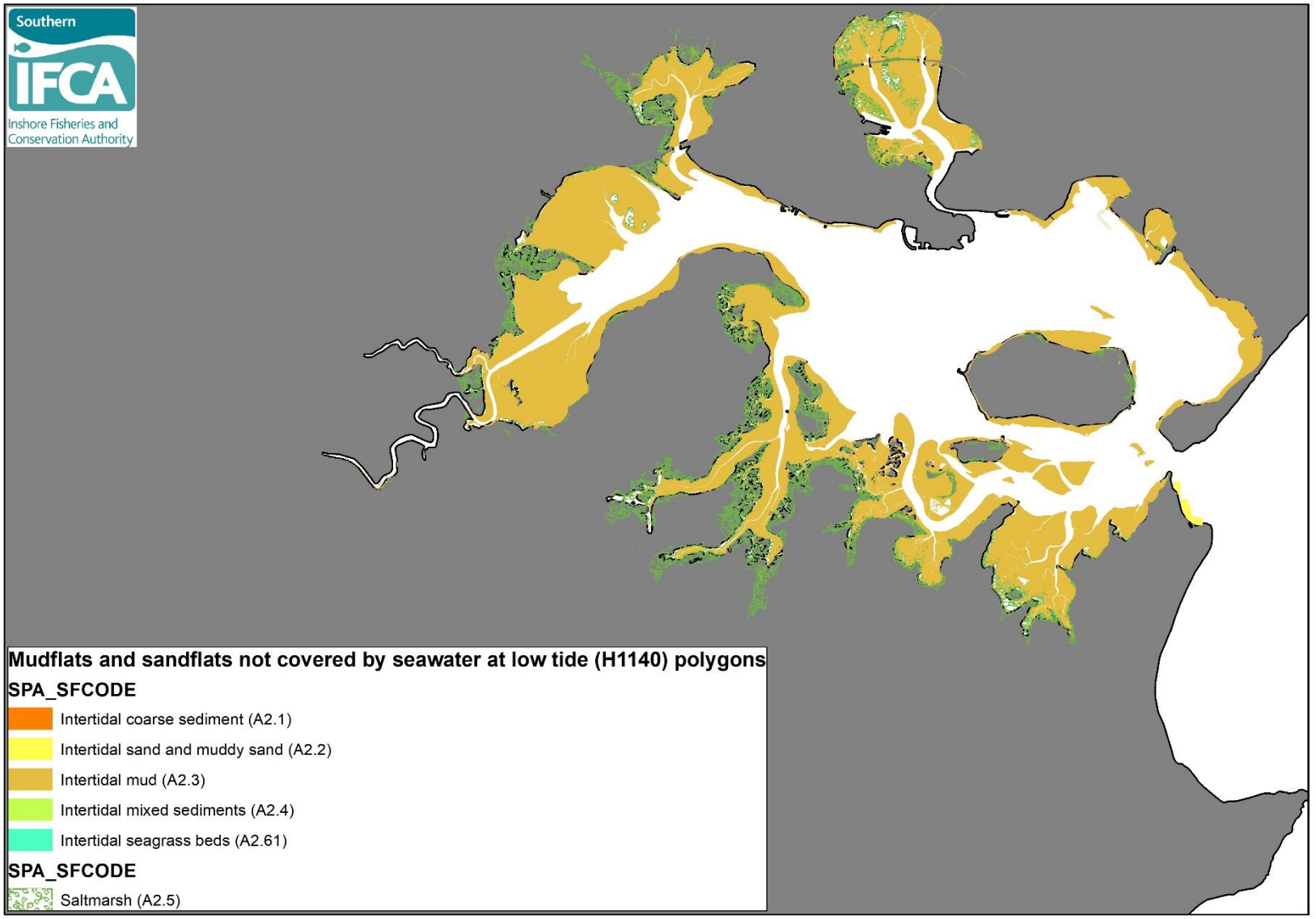
Annex 2: Supporting Habitat(s) Site Feature Map for Poole Harbour SPA



Annex 3: Poole Harbour Dredge Permit Activity Maps

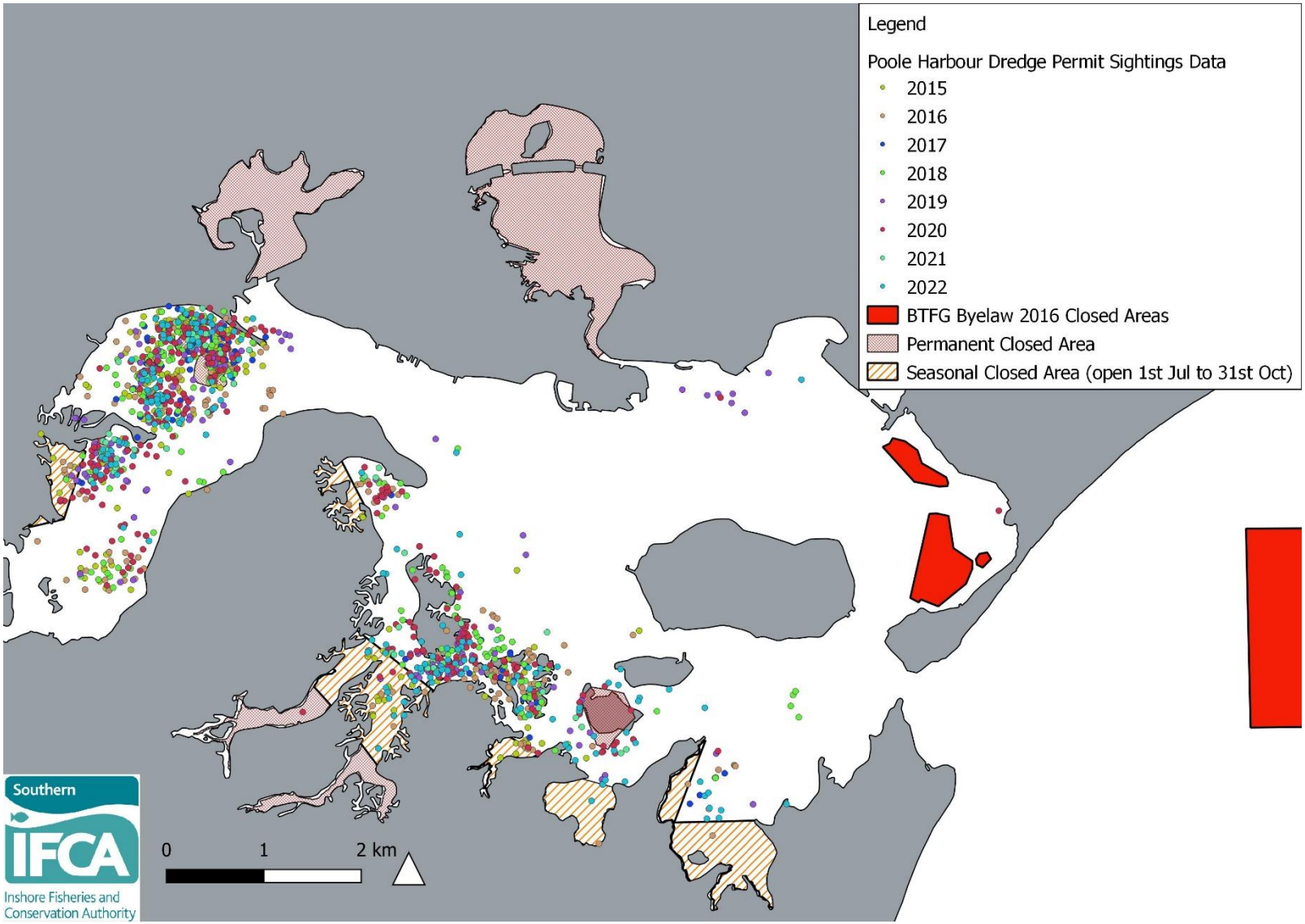


Figure A3: The map shows permit vessel sightings for the 2015/16 to 2022/23 seasons. Prohibited areas, seasonal closed areas and areas of seagrass closed under the Bottom Towed Fishing Gear Byelaw 2016 are also shown (reflects management in place as of 2022/23 season). Where vessel sightings overlap with seasonal closed areas, all sightings occurred during the period when these areas are open for fishing activity (1st July to 31st October). Note that the closed areas at Seagull Island and Green Island were not in place under permit conditions prior to the 2022/23 season.

Annex 4: Natural England's advice on the potential impacts of shellfish dredging on the nature conservation features of Poole Harbour SPA, Ramsar and SSSI.

Date:3rd June 2014

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Dear Rob

Poole Harbour Fishing Dredge Permit byelaw - NEs advice on the potential impacts of shellfish dredging on the nature conservation features of Poole Harbour SPA, Ramsar and SSSI

The following constitutes Natural England's formal advice as to the potential impacts of shellfish dredging on the nature conservation features of Poole Harbour.

1. Legal Requirements

Shellfish dredging takes place within Poole Harbour Site of Special Scientific Interest (SSSI). This SSSI is part of Poole Harbour Special Protection Area (SPA), and Poole Harbour Wetland of International Importance under the Ramsar Convention (Ramsar Site). Poole Harbour SPA and Ramsar site is afforded protection under the Habitats and Species Regulations 2010 (as amended) while Poole Harbour SSSI is afforded protection under the Wildlife and Countryside Act (1981) (as amended under the Countryside and Rights of Way Act 2000).

Natural England and S-IFCA have duties under Regulation 9 (3) of the Conservation of the Habitats & Species Regulations 2010 as competent authorities with functions relevant to marine conservation to exercise those functions so as to secure compliance with the Habitats Directive. Article 6.2 of the Habitats Directive requires appropriate steps to be taken to avoid, in Natura 2000 sites, the deterioration of natural habitats and habitats of species as well as significant disturbance of the species for which the area has been classified.[1] The IFCA also need to ensure that the measures proposed are compatible with the conservation and enhancement of the special interest of the Poole Harbour SSSI in line with the status as a Section 28 G authority under the Wildlife and Countryside Act 1981 (as amended).

This advice is to inform the scope of an assessment required by SIFCA to ensure that sufficient management measures are put in place through the fishing dredge permit byelaw to avoid damage or deterioration to the conservation features of the European Marine Site and ensure the activity is not likely to disturb or damage any of the interest features of the SSSI.

2. Protected Sites

Poole Harbour was classified as a SPA for birds because it supports an assemblage of over 20,000 waterfowl, internationally important populations of overwintering shelduck and black tailed godwit and over 1% of three species listed on Annex 1 of the birds directive (overwintering avocet, breeding common tern and breeding Mediterranean gull).

It is also a wetland of international importance under the Ramsar convention because it regularly supports over 20,000 waterfowl and over 1% of populations of avocet, black tailed godwit, common tern, Mediterranean gull and shelduck while also being a good example of an estuary, supporting an appreciable assemblage of rare, vulnerable or endangered species and being of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna including supporting the nationally scarce plants narrow leaved eelgrass *Zostera augustifolia* and dwarf eelgrass *Zostera noltii*.

Poole Harbour is also recognised as nationally important for its extensive mudflats and marshes which together with the permanent channels support large populations of overwintering waders and wildfowl. The fringing habitats support further rare and scarce fauna and flora including nesting birds. Several rare marine invertebrates also occur within the Harbour. With respect to nesting birds Poole Harbour condition assessment in 2010 noted the harbour was nationally important for its breeding populations of common and Sandwich terns, Mediterranean and black-headed gulls, Cetti's warbler, bearded tit and water rail. In a local context, the breeding population of the amber-listed redshank and reed bunting are also important. Other relevant species recorded breeding and part of the breeding bird assemblage include shelduck, little egret, grey heron, teal, mute swan, snipe, ringed plover, oystercatcher, reed warbler (Underhill-Day et al., 2010.)

The Poole Harbour SPA, Ramsar and SSSI citation are provided in Appendix 1.

3. Poole Harbour Special Protection Area

a) Conservation objectives

The conservation objectives for Poole Harbour SPA are found at Appendix 2

In summary, the qualifying features are Common shelduck (Non-breeding), Pied avocet (Non-breeding), Black-tailed godwit (Non-breeding), Mediterranean gull (Breeding), Common tern (Breeding) and the Waterbird assemblage. In addition, little egret and aquatic warbler were identified as qualifying features by the UK SPA Review in 2001. However more recent data suggests aquatic warbler nolonger qualify in terms of numbers. **B**reeding sandwich terns are however now occurring in internationally important numbers and therefore qualify. http://jncc.defra.gov.uk/page-1419). Natural England recommends that as a matter of best practice these additional qualifying features should be a material consideration when assessing the impact of activities on a site.

With regard to the individual species and/or assemblage of species for which the site has been classified ('the Qualifying Features') the conservation objectives are to '*Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable the aims of the Birds Directive.*'

Subject to natural change, to maintain or restore:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The populations of the qualifying features;
- The distribution of the qualifying features within the site.

b) *Sub Features (Supporting Habitats for the Qualifying Features)*

The key sub features (or habitats for the SPA qualifying features) are listed in the Regulation 33 advice Package for Poole Harbour:-

Internationally important populations of the regularly occurring Annex 1 species

Shallow Inshore Waters inc. Lagoons - Shallow tidal waters provide key feeding habitat for the Annex 1 species common tern. avocet, and Mediterranean gull. Brownsea Island lagoon is an essential feeding area for wintering avocet. It also provides key nesting islands for common tern, however these are above highest astronomical tide and therefore not within the European marine site boundary. Shallow inshore waters are of importance for feeding common terns and to a lesser extent, for the qualifying population of breeding Mediterranean gulls which will also occasionally feed in these areas.

Intertidal Sediment Communities - Mudflats and sandflats support rich populations of intertidal invertebrate species, which in turn provide a food source for wintering avocets and breeding Mediterranean gull. Although avocets occasionally swim, they generally feed whilst wading on the intertidal sediments in areas of very shallow water. These habitats also provide important roosting areas for both species

Saltmarsh Communities - This habitat is of importance for providing roosting, feeding and nesting habitat. Upper saltmarsh is of importance as nesting habitat for both common tern and Mediterranean gull, whilst saltmarsh habitats, and in particular the associated creeks are also used as a feeding area by Mediterranean gull. Saltmarsh provides ideal highwater roosts for all of the annex 1 species.

Internationally important assemblage of waterfowl including internationally important populations of regularly occurring migratory bird species

Shallow Inshore Waters inc. Lagoons - Shallow tidal waters provide key feeding and roosting habitat for the internationally important populations of wintering shelduck. Shallow tidal waters also provide key feeding habitat for nationally important populations of goldeneye, red-breasted merganser and cormorant, which feed on fish and small molluscs.

Intertidal Sediment Communities Mudflats and sandflats support rich populations of intertidal invertebrate species, which in turn provide a food source for the internationally important populations of black-tailed godwit and shelduck. Nationally important populations including dunlin, teal, curlew, spotted redshank, greenshank, redshank and black-headed gull also feed on these rich populations of intertidal invertebrate species. Nationally important populations of dark-bellied brent geese feed on *Zostera* and *Enteromorpha* that grow on the intertidal sediment communities. These habitats provide important roosting areas for all of these species.

Saltmarsh Communities - Upper and lower saltmarsh provide important feeding areas for the internationally important assemblage of waterfowl and its qualifying species. Upper saltmarsh in particular also makes ideal highwater roost sites. Dark-bellied brent geese and teal feed on saltmarsh plants and their seeds.

Reedbeds - These provide feeding and roosting areas for a proportion of the internationally important assemblage of waterfowl. They are of particular importance for teal and pochard. Reed beds also play a key role in providing shelter for adjacent sub features.'

c) Potential impacts on attribute targets that could prevent the achievement of the conservation objectives for the SPA

The attributes listed in the tables in Appendix 3 are considered to be those most likely to contribute to this European Site's ecological integrity and towards the achievement of the European Site Conservation Objectives.

Natural England consider that shellfish dredging activity could prevent the site from achieving its conservation objectives through impacts on the following attributes:-

i) Disturbance caused by human activity (minimising disturbance)

The frequency, duration and/or intensity of disturbance affecting the foraging and roosting overwintering waterbird assemblage, avocet, black tailed godwit, shelduck and little egret should not reach levels which significantly affects the feature.

Potential Impact
Over the winter 2011/2012 a study of disturbance with respect to bird behaviour (waders and wildfowl) in relation to activities in the Harbour took place (Liley & Fearnley, 2012). The report found disturbance levels appeared to affect the distribution of birds within the harbour with bird densities lower where more people or boats were observed. The report found water based activities were generally more disturbing than intertidal activities with shore based activities the

1 Article 6.2 of the Habitats Directive requires appropriate steps to be taken to avoid, in Natura 2000 sites, the deterioration of natural habitats and habitats of species as well as significant disturbance of the species for which the area has been classified. (Article 7 clarifies that this Article should also apply to obligations arising from the Birds Directive)

least disturbing. Although the study did not focus on the areas where shellfishing activity took place, major fights were observed to occur at Wareham channel and the frequency at which the activity was observed more widely to take place in proximity to important areas for feeding and roosting birds was deemed a concern. It cannot be dismissed therefore that shellfish dredging together with other disturbance factors are not causing a significant disturbance to the features of the SPA when taking place in proximity to key feeding and roosting habitat (eg saltmarsh and shallow inshore waters).

The European Commission guidance states that any event contributing to the reduction or to the risk of reduction of the range of the species within the site or a reduction of the size of the habitat of the species within the site can be regarded as a significant disturbance[1].

Shellfish dredging activity can cause noise and visual disturbance (either alone or in combination with other plans and projects) to the features listed above when taking place at key times of the year for the overwintering and in proximity to important feeding and roosting sites. The significance of this disturbance is likely to depend on the availability of alternative undisturbed areas for birds; and the frequency and intensity at which shellfish dredging takes place (Liley & Fearnley, 2012).

ii) Extent and Distribution of supporting non-breeding habitat

The extent and distribution of suitable habitat (either within or outside the site boundary) which supports overwintering waterbird assemblage, avocet, black tailed godwit, shelduck and little egret for all stages of the non-breeding period (moulting, roosting, loafing, and feeding) is maintained.

Potential Impact
The main eelgrass beds within the intertidal sediment communities in Poole Harbour are known to support fish eating species such as red breasted mergansers as well as providing a food source for dark bellied brent geese. Physical damage could occur from shellfish dredging if it takes place within this habitat. The direct impact of shellfish dredging on seagrass beds is significant through uprooting shoots and cutting through shoots which immediately reduces seagrass density and biomass) (Wheeler et al, 2014). The towed gear byelaw recently introduced to prohibit towed gear over the main eelgrass beds in Poole Harbour is an important mitigation measure to avoid an impact from this activity.

Shellfish dredging if taking place in close proximity to saltmarsh roosts sites could potentially also cause erosion of this supporting non breeding habitat.

iii) Extent and Distribution of supporting breeding habitat

The extent, distribution and availability of suitable breeding habitat which supports common tern, sandwich tern and mediterranean gull for all stages of their breeding cycle (courtship, nesting, feeding) is maintained.

Potential Impact
Mediterranean gulls nest primarily at Seagull island in the Wareham channel. Shellfish dredging if taking place in close proximity to saltmarsh nesting sites could potentially cause erosion of this supporting breeding habitat. Dyrynda (1995) considered saltmarsh to be a habitat that would be sensitive to baitdragging and similarly the habitat would likely to be sensitive to other towed gear if it takes place here. As with dragging it would be considered unlikely to take place in this habitat although this should be monitored.

[1] European Commission. 2000. **Managing Natura 2000 sites : The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.** Luxembourg: Office for Official Publications of the European Communities.

Common and sandwich tern nest at Brownsea Lagoon where there is no fishing access.

iv) Breeding Population (productivity and survival)

Overall breeding productivity and adult survival is at a level which is consistent with maintaining the structure and abundance of the population of Mediterranean gulls at or above its current or target level, whichever is the higher or all stages of its breeding cycle (courtship, nesting, feeding) is maintained.

Potential Impact
Disturbance of Mediterranean gull nesting sites from fishing taking place in proximity to Seagull Island could cause a decline in the annual productivity or breeding success of the population (i.e. the number of chicks successfully raised per breeding pair per year) and this may adversely affect the overall size and age-structure of the breeding population and its long-term viability. Common and sandwich tern nest at Brownsea Lagoon where there is no fishing access and would therefore not be exposed to disturbance.

iv) Food availability (Function and supporting processes)

Maintain the overall prey availability of key prey species of preferred prey sizes which supports overwintering waterbird assemblage, avocet, black tailed godwit, shelduck and little egret and breeding common tern, sandwich tern and Mediterranean gull

Potential Impact
Sediment disturbance as a result of shellfish dredging (and in combination with other activities eg baitdigging and baitdragging) can potentially impact on bird prey availability, prey size and the birds ability to forage. This can be through removal (mortality) of target and non target species species and impacts on non target prey availability through changes in habitat structure of the intertidal sediment communities.

Dredging on muddy habitats has generally been found to have a greater impact on benthic communities compared to mobile sands. Dredge scars on deeper, more stable habitats appear to persist longer than more mobile intertidal habitats. Impacts on sediment disturbance are likely to be related to whether the impact takes place at a high energy site or a sheltered site, with sediment recovery slower at the latter. Most small-scale experimental studies have shown that recovery of communities following cessation of fishing can generally occur within months to a year. However the longer-term impacts of broad scale, intensive and frequent disturbances to benthic communities has not been well researched (Wheeler et al,2014)).

The length of time that harvested areas would require for recovery will be a function of the amount of natural disturbance experienced in that environment, and the timing of harvesting in relation to larval recruitment of target and non-target species (Wheeler et al 2004).

Release of sediment contaminants such as heavy metals from sediment disturbance by shellfish dredging could also impact on prey availability.

4. Poole Harbour Ramsar

In addition to the above overwintering waders and wildfowl, the Ramsar site is also designated for its eelgrass beds. As stated above physical damage could occur from shellfish dredging if it takes place within this habitat. The direct impact of shellfish dredging on seagrass beds is significant through uprooting shoots and cutting through shoots which immediately reduces seagrass density and biomass) (Wheeler et al, 2014) The towed gear byelaw recently introduced to prohibit towed gear over the main eelgrass beds in Poole Harbour is an important mitigation measure to avoid an impact from this activity.

5. Poole Harbour SSSI

In addition to the bird features for which the SPA is classified the SSSI is designated for nesting birds using the fringing reedbed and saltmarsh habitats of Poole Harbour and marine invertebrates. Shellfish dredging activity has the potential to damage the breeding bird assemblage feature through disturbance to breeding birds effecting breeding productivity when taking place in proximity to their nesting and feeding sites. Unusually dense forests of the peacock worm *Sabella pavonina* were recorded in the channels of the Harbour in the 80's associated with the subtidal fine sands of the central harbour and towed gear could potentially damage this feature if it was to take place over these channels (Dyrynda, 1995).

Poole Harbour Aquatic Management Plan

Poole Harbour's Aquatic Management Plan serves as Poole Harbour's European Marine Site management scheme under which relevant authorities functions (including any power to make byelaws) are to be exercised so as to secure in relation to that site compliance with the requirements of the Habitats Directive. *www.**pooleharbour**aqmp.co.uk*

The management plan sets out the need to manage shellfish dredging in the harbour due to the potential for this activity to displace birds from breeding, feeding & roosting grounds, possible damage to eel grass beds and subtidal habitats by dredging equipment and the detrimental effects on non target species. The importance of SIFCAs byelaws to manage this activity is highlighted as an important management measure.

Bird Sensitive Areas – All recreational users are asked in Poole Harbour"s Aquatic Management Plan to avoid these areas at key times of the year. (The Poole Harbour Aquatic Management Plan serves as Poole Harbours European Marine Site Management Scheme).

Bird Sensitive Areas

These are areas where at present there is relatively little disturbance, or areas where the geographically enclosed nature of the bays means that activities such as shellfish dredging would have the potential to disturb birds over a large area. They are also areas where birds appear to be preferentially feeding and roosting and where the key bird interests for which the Harbour is recognised as important reside (Drake, 2006).

Appendix 4 shows the Bird Sensitive Areas which have been identified as being of particular importance to overwintering and breeding birds. During the winter, principally between 1st November and 31st March, it is essential that disturbance in the 'Overwintering Bird Sensitive Areas' are kept to a minimum to ensure these migratory birds have every opportunity to feed and rest.

During the spring, between mid April and the end of June Mediterranean gulls and common terns breed at 'Gull Island' and 'Brownsea Lagoon' respectively and disturbance should be avoided to ensure the successful hatching of eggs and rearing of chicks of these rare bird species. Appendix 4

6. Poole Harbour Condition Assessment

SIFCA should also consider the current condition of the site when determining the significance of effect of shellfish dredging on Poole Harbour SPA, Ramsar and SSSI.

The latest analysis of data spanning over several decades by the British Trust for Ornithology (BTO) recorded declines in a numbers of some bird species in Poole Harbour. Comparison by BTO of national, regional and local trends suggest that for shelduck, curlew, redshank and lapwing

these declines are likely to be due to site-specific pressures while the declining trends of the other species appear to reflect a broad-scale shift in population. For further information see the species accounts under http://www.bto.org/volunteer-surveys/webs/publications/webs-alerts

Bird count data (WeBs data) analysed by Natural England in 2012 also highlighted declines in the numbers of overwintering birds in some sectors of the Harbour. (Appendix 6). The data analysis highlighted in particular there was concern regarding declines in some species in Lytchett Bay (shelduck, redshank and dunlin) Brands Bay (shelduck, redshank, dark bellied brent geese, dunlin) and Wych (shelduck, black tailed godwit, dunlin).

A condition assessment of Poole Harbour SSSI was compiled in 2010.The features of interest of the Ramsar and SPA were also covered in this assessment. The main concern from the assessment is the high inputs of nitrogen into the Harbour and the consequent algal mat growth which is at levels that could impact on bird prey availability and bird foraging behaviour. A further concern is the possible reduction in the abundance and variety of benthic invertebrates with a decline in biomass of some 26% between surveys in 2002 and 2009. This may be due to year to year fluctuations in variability and slight differences in the sampling methodology although the difference is of sufficient magnitude to cause concern. There is still uncertainty as to the long term effects of pump scoop dredging and other disturbances on invertebrate distribution and abundance. (Underhill-Day et al., 2010).

Generally the breeding bird community in the Harbour is retaining its interest, and scores as in favourable condition both for sand dunes and salt marshes, and for lowland open water and margins. However breeding redshank were last recorded as being in decline. (Underhill-Day et al., 2010; Chown & Cook, 2004).

Summary

SIFCA need to take appropriate steps to manage shellfish dredging to avoid the deterioration of natural habitats and habitats of species as well as significant disturbance of the species for which the area has been classified as a SPA and a Ramsar site. Without adequate mitigation measures put in place in SIFCAs fishing dredge permit byelaw a likely significant effect on Poole Harbour Special Protection Area and Ramsar site cannot be excluded, either individually or in combination with other plans or projects. SIFCA need to consider what mitigation measures are needed to exclude this significant effect from shellfish dredging or commence work on an appropriate assessment in order to ascertain that the activity will not adversely affect the integrity of Poole Harbour SPA and Ramsar.

Furthermore, Natural England is of the view that without adequate mitigation measures there would likely be damage to the interest features of the Poole Harbour SSSI from this activity and mitigation measures need to be provided in order to avoid this damage to the SSSI.

7. Potential Mitigation Measures

Natural England's advice is that to protect the SPA, Ramsar interest and SSSI, management should seek to :-

i) Provide a network of areas where there is little or no noise and visual disturbance and sediment disturbance

These areas could include a combination of spatial or temporal areas where potentially disturbing activities are excluded at key times of the year in areas vulnerable to disturbance and sediment disturbance and that are particularly important to securing the SPA and Ramsar and SSSI interests.

Vulnerable/important areas should include:-

- Bird Sensitive Areas,
- Areas where declines in some bird species have been observed eg Brands Bay, Wych and Lytchett Bay,
- Mediterranean gull nesting sites at Seagull island
- Areas where sediment recovery is likely to be slow ie low energy sites
- Fringing saltmarsh, reedbed and lowland water habitats supporting breeding birds

Appendix 5 provides key times of year where SPA, Ramsar and SSSI features may be vulnerable to an impact from cockle and clam dredging through noise/visual disturbance or impacts on prey availability through sediment disturbance.

ii) Exclude or manage intensity where high levels of sediment disturbance could result in release of contaminants eg parts of Holes Bay

iii) Manage shellfish dredging throughout the Harbour in a way that minimises its impact on prey availability and disturbance. For example through restrictions in the number of licences, the design of the pump and dredge used and restrictions in the timing of when the fishery should take place

iv) Ensure measures are taken to protect habitats (ie eelgrass and saltmarsh) and marine invertebrates (eg *Sabella pavonina*) that are potentially sensitive to damage if they are at risk of exposure to shellfish dredging

8) Summary

In summary when SIFCA decide on the management measures to be put under the permit conditions of the dredge byelaw, after consultation with the stakeholders, they will need to consider this advice, and other evidence of the potential effects of shellfish dredging on Poole Harbour SPA and Ramsar site, to ensure the proposed measures are sufficient to be able to conclude no likely significant effect either alone or in combination with other plans and projects.

The effectiveness of any management measures implemented to avoid an adverse effect on Poole Harbour SPA and Ramsar from shellfish dredging should subsequently be monitored and reviewed.

The IFCA should also ensure that the measures proposed are compatible with the conservation and enhancement of the special interest of the Poole Harbour SSSI in line with the status as a Section 28 G authority under the Wildlife and Countryside Act 1981 (as amended).

Natural England would be happy to provide further advice on any specific management options put forward and our views as to whether sufficient measures have been put forward to ensure the nature conservation interests of the site have been adequately protected.

Please do not hesitate to contact me if you would like to discuss any of the above further.

Yours sincerely

Sue Burton
Lead Marine Adviser
Dorset, Hampshire and Isle of Wight Team
07500 097405
Susan.burton@naturalengland.org.uk

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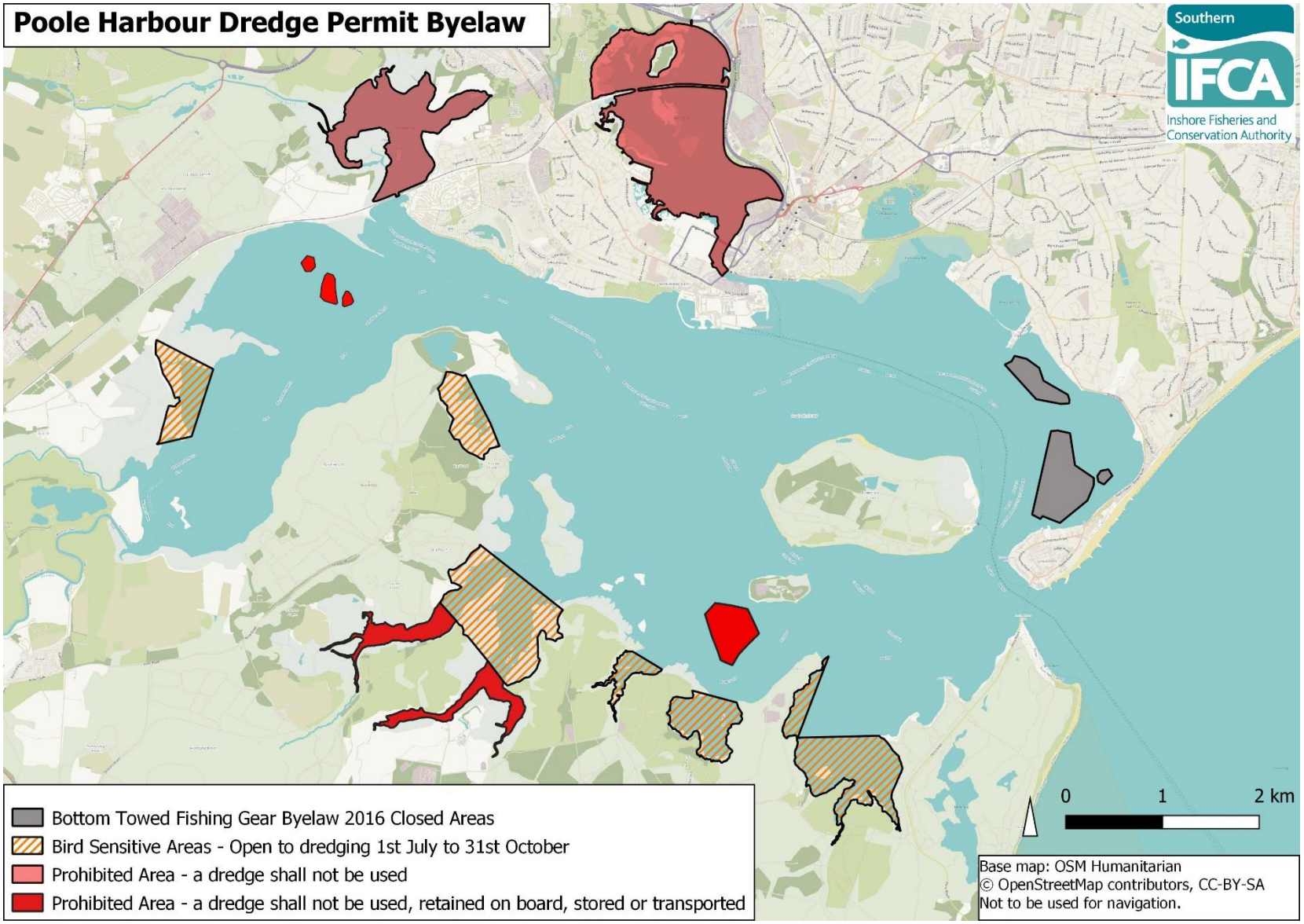
Annex 5: Poole Harbour Dredge Permit byelaw spatial and temporal restrictions



 SIFCA Reference: SIFCA/HRA_PP/PHDPByelaw202324

Annex 6: Poole Harbour Dredge Permit 2023/24 including permit conditions

Poole Harbour Dredge Permit

This permit authorises the named person in respect to the named vessel, for the period of validity specified below, to use, retain on board, store or transport a dredge within Poole Harbour, subject to the provisions of the Poole Harbour Dredge Permit Byelaw and to the additional conditions listed in this permit.

Vessel Authorised is: **NAME and PLN**

Permit is issued to: **Mr/Mrs X**

Permit Number: **2023-24 XXX**

Vessel length (m):

Vessel engine power (kw):

Cost of Permit: **£675.00**

Permit valid for period: **1st April 2023 – 31st March 2024**

The permit holder should ensure that they have read and understand the Southern IFCA Poole Harbour Dredge Permit byelaw and the Permit Conditions prior to fishing.

Failure to comply with any of the Permit Conditions constitutes contravention of the Poole Harbour Dredge Permit byelaw.

Permit Conditions

1. **Definitions**

1.1 In this permit:

a. “spray bar” means any object that directs a pressurised jet(s) of water;

b. “riddle” means a table with spaced bars for the sorting of shellfish;

c. “tooth bar” means the bar, to which is attached teeth, the ends of which point downwards and are dragged along the sea bed when the dredge is towed;

d. “auxiliary hydraulic equipment” shall include but is not limited to any water pump and associated hoses that are designed for, or capable of being used in connection with a shellfish dredge and any hydraulic lifting equipment, when used in connection with a shellfish dredge.

e. “interaction” means direct contact between any part of the fishing vessel or dredge, as defined in the Poole Harbour Dredge Permit byelaw, and any part of an individual listed as an Endangered, Threatened and Protected (ETP) Species; and

f. “Endangered, Threatened and Protected (ETP) Species” are those species protected by and listed under national and international legislation and listings including but not limited to The Birds Directive (2009/147/EC), The Habitats Direct (92/43/EEC), the Convention on International Trade in Endangered Species (CITES) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

2. Catch reporting

2.1 For the months of May, June, July, August, September, October, November and December the permit holder must submit to the Authority a completed catch return using a ‘Poole Harbour Dredge Permit Monthly Catch Return Form’. Completed catch returns must be submitted either in hard copy or as an electronic PDF document and must be received by the Authority no later than the 14th day of the following month.

2.2 For each day of the month the permit holder must state in their catch return:

i. the hours spent fishing; and
ii. the quantity in kilograms of each species caught that day; *and*
iii. the number of the zone(s) in which the quantities of species caught that day have been taken according to the zonation map provided with the catch return form; *and*
iv. the name(s) of the company or individual to whom all parts of the catch was sold.

2.3 If no fishing has taken place during a day, the permit holder must declare that no catch was taken on that day by entering the word "nil" in the column for "Species caught and Quantity”.

2.4 If no fishing has taken place during a month, the permit holder must indicate this to the Southern IFCA by submitting a “nil” catch return.

2.5 If a permit holder has an interaction between their fishing activity and an Endangered, Threatened and Protected (ETP) Species, the permit holder must submit to the Authority a completed interaction form using a 'Poole Harbour Dredge Permit Byelaw Interaction between dredge fishing activity and Endangered, Threatened and Protected (ETP) Species Reporting Form'.

3. Catch Restrictions

3.1 No person shall fish for or take from Poole Harbour any Native oyster (*Ostrea edulis*).

4 Gear types

4.1 Dredge designs are restricted to a basket size not exceeding 460 mm in width by 460 mm in depth by 300 mm high excluding any pole or attachments.

5 Gear construction and restrictions

5.1 Dredges must be constructed of rigid bars having spaces of not less than 18 mm between them. Any cross pieces used to strengthen the basket must have minimum spaces of 40 mm between them.

5.2 Only one dredge is allowed to be used at any one time on each vessel.

5.3 The contents of the dredge may only be removed after the dredge has been lifted into the vessel.

5.4 A second dredge may be carried on board but it must be inboard, stowed and disconnected.

5.5 Only one pump is permitted on board any vessel and any hoses connected to the pump and/or dredge should have a diameter of no greater than a 3 inch inlet and a 3 inch diameter outlet.

5.6 The maximum horsepower of the pump is 15 (fifteen).

5.7 A maximum of one spray bar is permitted to be used per dredge and must be fixed to the dredge. When using a dredge fitted with a tooth bar any associated spray bar must direct the flow of water towards the rear of the basket and at no times directly towards the seabed.

5.8 A riddle with 18mm bar spacing is mandatory for the sorting of shellfish. Any shell discards are to be re-deposited forthwith.

6 Spatial and temporal restrictions

6.1 Closed Season

6.1.1 A dredge shall not be used, retained on board, stored or transported in any area of Poole Harbour from 1st April to 24th May 2023, both days inclusive, and from 24th December 2023 to 31st March 2024, both days inclusive.

6.2 Daily Fishing Hours

6.2.1 A dredge shall not be used in any area of Poole Harbour between 18.00 and 06.00 each day.

6.2.2 A dredge shall not be used in any area of Poole Harbour during all Sundays.

6.3 Seasonal Closure Areas

6.3.1 A dredge shall not be used, retained on board, stored or transported in the following areas from 25th May to 30th June, both days inclusive and from 1st November to 23rd December, both days inclusive, in the same year:

AREA 1 – NEWTON BAY
The area enclosed by a line drawn from:
Point 1 (50 Degrees 40.351 minutes North, 001 Degrees 59.493 minutes West) to
Point 2 (50 Degrees 40.402 minutes North, 001 Degrees 59.750 minutes West)
From point 2 along the coast at the level of mean high water spring tide to point 1

AREA 2 – OWER BAY
The area enclosed by a line drawn from:
Point 3 (50 Degrees 40.522 minutes North, 002 Degrees 00.101 minutes West) to
Point 4 (50 Degrees 40.670 minutes North, 002 Degrees 00.464 minutes West)
From point 3 along the coast at the level of mean high water spring tide to point 4

AREA 3 – WYCH LAKE AND MIDDLEBERE LAKE
The area enclosed by a line drawn from:
Point 5 (50 Degrees 41.255 minutes North, 002 Degrees 01.755 minutes West) to
Point 6 (50 Degrees 40.891 minutes North, 002 Degrees 01.030 minutes West)
From point 6 along the coast at the level of mean high water spring tide to point 7
Point 7 (50 Degrees 40.468 minutes North, 002 Degrees 01.529 minutes West) to
Point 8 (50 Degrees 40.795 minutes North, 002 Degrees 01.911 minutes West) to
Point 9 (50 Degrees 40.896 minutes North, 002 Degrees 02.157 minutes West)
From point 9 along the coast at the level of mean high water spring tide to point 5

AREA 4 – ARNE BAY
The area enclosed by a line drawn from:
Point 10 (50 Degrees 41.941 minutes North, 002 Degrees 01.651 minutes West) to
Point 11 (50 Degrees 42.204 minutes North, 002 Degrees 01.843 minutes West)
From point 11 along the coast at the level of mean high water spring tide to point 10

AREA 5 – KEYSWORTH
The area enclosed by a line drawn from:

Point 12 (50 Degrees 42.400 minutes North, 002 Degrees 04.510 minutes West) to
Point 13 (50 Degrees 42.264 minutes North, 002 Degrees 04.078 minutes West) to
Point 14 (50 Degrees 41.890 minutes North, 002 Degrees 04.259 minutes West) to
Point 15 (50 Degrees 41.842 minutes North, 002 Degrees 04.555 minutes West)
From point 15 along the coast at the level of mean high water spring tide to point 12

AREA 6 - BRANDS BAY SOUTH
The area enclosed by a line drawn from:
Point 16 (50 Degrees 40.156 minutes North, 001 Degrees 58.984 minutes West) to
Point 17 (50 Degrees 40.156 minutes North, 001 Degrees 58.249 minutes West)
From point 16 along the coast at the level of mean high water spring tide to point 17

AREA 7 – BRANDS BAY WEST
The area enclosed by a line drawn from:
Point 16 (50 Degrees 40.156 minutes North, 001 Degrees 58.984 minutes West) to
Point 18 (50 Degrees 40.610 minutes North, 001 Degrees 58.702 minutes West)
From point 18 along the coast at the level of mean high water spring tide to point 16

6.4 Closed Areas

6.4.1 A dredge shall not be used in the following areas at all times:

AREA 8 - LYCHETT BAY
The area enclosed by a line drawn from:
Point 19 (50 Degrees 43.212 minutes North, 002 Degrees 02.412 minutes West) to
Point 20 (50 Degrees 43.205 minutes North, 002 Degrees 02.439 minutes West) From point 20 along the coast at the level of mean high water spring tide to point 19

AREA 9 - HOLES BAY
The area enclosed by a line drawn from:
Point 21 (50 Degrees 42.771 minutes North, 001 Degrees 59.539 minutes West) to
Point 22 (50 Degrees 42.734 minutes North, 001 Degrees 59.591 minutes West)
From point 22 along the coast at the level of mean high water spring tide to point 21

6.4.2 A dredge shall not be used, retained on board, stored or transported in the following areas at all times:

AREA 10 – WYCH LAKE
The area enclosed by a line drawn from:
Point 7 (50 Degrees 40.468 minutes North, 002 Degrees 01.529 minutes West) to
Point 8 (50 Degrees 40.795 minutes North, 002 Degrees 01.911 minutes West)
From point 8 along the coast at the level of mean high water spring tide to point 7

AREA 11 – MIDDLEBERE LAKE
The area enclosed by a line drawn from:
Point 8 (50 Degrees 40.795 minutes North, 002 Degrees 01.911 minutes West) to
Point 9 (50 Degrees 40.896 minutes North, 002 Degrees 02.157 minutes West)
From point 9 along the coast at the level of mean high water spring tide to point 8

AREA 12 – GREEN ISLAND
The area enclosed by a line drawn from:
Point 1 (50 Degrees 40.876 minutes North, 001 Degrees 59.407 minutes West) to

Point 2 (50 Degrees 40.809 minutes North, 001 Degrees 59.357 minutes West) to
Point 3 (50 Degrees 40.739 minutes North, 001 Degrees 59.310 minutes West) to
Point 4 (50 Degrees 40.684 minutes North, 001 Degrees 59.398 minutes West) to
Point 5 (50 Degrees 40.626 minutes North, 001 Degrees 59.490 minutes West) to
Point 6 (50 Degrees 40.567 minutes North, 001 Degrees 59.550 minutes West) to
Point 7 (50 Degrees 40.580 minutes North, 001 Degrees 59.600 minutes West) to
Point 8 (50 Degrees 40.594 minutes North, 001 Degrees 59.650 minutes West) to
Point 9 (50 Degrees 40.640 minutes North, 001 Degrees 59.670 minutes West) to
Point 10 (50 Degrees 40.732 minutes North, 001 Degrees 59.724 minutes West) to
Point 11 (50 Degrees 40.852 minutes North, 001 Degrees 59.780 minutes West) to
Point 12 (50 Degrees 40.913 minutes North, 001 Degrees 59.690 minutes West) to
Point 13 (50 Degrees 40.898 minutes North, 001 Degrees 59.550 minutes West) to
Point 1.

AREA 13 – SEAGULL ISLAND NORTH

The area enclosed by a line drawn from:
Point 1 (50 Degrees 42.880 minutes North, 002 Degrees 03.233 minutes West) to
Point 2 (50 Degrees 42.869 minutes North, 002 Degrees 03.174 minutes West) to
Point 3 (50 Degrees 42.818 minutes North, 002 Degrees 03.161 minutes West) to
Point 4 (50 Degrees 42.792 minutes North, 002 Degrees 03.200 minutes West) to
Point 5 (50 Degrees 42.791 minutes North, 002 Degrees 03.249 minutes West) to
Point 6 (50 Degrees 42.839 minutes North, 002 Degrees 03.287 minutes West) to
Point 1.

AREA 14 – SEAGULL ISLAND CENTRE

The area enclosed by a line drawn from:
Point 1 (50 Degrees 42.781 minutes North, 002 Degrees 03.056 minutes West) to
Point 2 (50 Degrees 42.769 minutes North, 002 Degrees 03.005 minutes West) to
Point 3 (50 Degrees 42.749 minutes North, 002 Degrees 02.990 minutes West) to
Point 4 (50 Degrees 42.680 minutes North, 002 Degrees 02.987 minutes West) to
Point 5 (50 Degrees 42.613 minutes North, 002 Degrees 02.971 minutes West) to
Point 6 (50 Degrees 42.606 minutes North, 002 Degrees 02.986 minutes West) to
Point 7 (50 Degrees 42.626 minutes North, 002 Degrees 03.086 minutes West) to
Point 8 (50 Degrees 42.649 minutes North, 002 Degrees 03.120 minutes West) to
Point 9 (50 Degrees 42.715 minutes North, 002 Degrees 03.108 minutes West) to
Point 10 (50 Degrees 42.768 minutes North, 002 Degrees 03.079 minutes West) to
Point 1.

AREA 15 – SEAGULL ISLAND SOUTH

The area enclosed by a line drawn from:
Point 1 (50 Degrees 42.679 minutes North, 002 Degrees 02.897 minutes West) to
Point 2 (50 Degrees 42.678 minutes North, 002 Degrees 02.875 minutes West) to
Point 3 (50 Degrees 42.661 minutes North, 002 Degrees 02.853 minutes West) to
Point 4 (50 Degrees 42.628 minutes North, 002 Degrees 02.831 minutes West) to
Point 5 (50 Degrees 42.618 minutes North, 002 Degrees 02.832 minutes West) to
Point 6 (50 Degrees 42.605 minutes North, 002 Degrees 02.849 minutes West) to
Point 7 (50 Degrees 42.592 minutes North, 002 Degrees 02.911 minutes West) to
Point 8 (50 Degrees 42.599 minutes North, 002 Degrees 02.928 minutes West) to
Point 9 (50 Degrees 42.645 minutes North, 002 Degrees 02.925 minutes West) to
Point 1.

Date .....

Signed .....
Chief / Deputy Chief Officer
Southern Inshore Fisheries and Conservation Authority

Annex 7: TLSE summary for each feature (and supporting habitats)

Feature	Supporting Habitat	Pressures	Common tern	Mediterranean gull	In/Out	Relevant Attributes
Surface-feeding birds	Water column	Abrasion/disturbance of the substrate on the surface of the seabed			Out	N/A
Mediterranean gull	Saltmarsh features	Changes in suspended solids (water clarity)	S	NS	Out	N/A
Common tern	Intertidal mixed sediment (Mediterranean gull only)	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion			Out	N/A
Sandwich tern	Intertidal mud (Mediterranean gull only)	Removal of non-target species			Out	N/A
Black-headed gull	Intertidal sand and muddy sand (Mediterranean gull only)	Removal of target species			Out	N/A
		Smothering and siltation rate changes (Light)			Out	N/A
		Visual disturbance	S	S	In	Supporting habitat: disturbance caused by human activity
		Above water noise	S	S	In	
		Collision ABOVE water with static or moving objects not naturally found in the marine environment	S	S	Out	N/A
		Collision BELOW water with static or moving objects not naturally found in the marine environment	S	S	Out	N/A
		Deoxygenation			Out	N/A
		Hydrocarbon and PAH contamination	IE	IE	Out	N/A
		Introduction of light	IE	IE	Out	N/A
		Introduction of microbial pathogens	S	S	Out	N/A
		Introduction or spread of invasive non-indigenous species	S	S	Out	N/A
		Litter	S	S	Out	N/A
		Nutrient enrichment			Out	N/A
		Organic enrichment			Out	N/A
		Physical change (to another sediment type)			Out	N/A
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	IE	IE	Out	N/A

		Transition elements and organo-metal (e.g. TBT) contamination	IE	IE		Out	N/A
		Underwater noise changes	IE	IE		Out	N/A

Feature	Supporting Habitat	Pressures	Pied avocet	Black-tailed godwit	Shelduck	In/Out	Relevant Attributes
Estuarine birds	Water column	Abrasion/disturbance of the substrate on the surface of the seabed				Out	N/A
Pied avocet	Saltmarsh features	Changes in suspended solids (water clarity)				Out	N/A
Little egret	Intertidal mixed sediment	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion				Out	N/A
Eurasian spoonbill	Intertidal mud	Removal of non-target species				Out	N/A
Shelduck	Intertidal sand and muddy sand	Removal of target species				Out	N/A
Black-tailed godwit		Smothering and siltation rate changes (Light)				Out	N/A
Dunlin		Visual disturbance	S	S	S	In	Supporting habitat: disturbance causd by human activity
Dark-bellied Brent goose		Above water noise	S	S	S	In	
Teal		Collision ABOVE water with static or moving objects not naturally found in the marine environment	S	S	S	Out	N/A
Goldeneye		Collision BELOW water with static or moving objects not naturally found in the marine environment				Out	N/A
Red-breasted merganser		Deoxygenation				Out	N/A
Curlew		Hydrocarbon and PAH contamination	IE	IE	IE	Out	N/A
Spotted redshank		Introduction of light	S	S	S	Out	N/A
Greenshank		Introduction of microbial pathogens	S	S	S	Out	N/A
Redshank		Introduction or spread of invasive non-indigenous species	NS	S	S	Out	N/A
Pochard		Litter	IE	IE	IE	Out	N/A
		Nutrient enrichment				Out	N/A
		Organic enrichment				Out	N/A

		Physical change (to another sediment type)				Out	N/A
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	IE	IE	IE	Out	N/A
		Transition elements and organo-metal (e.g. TBT) contamination	S	S	S	Out	N/A
		Underwater noise changes			IE	Out	N/A
Feature	**Supporting Habitat**	Pressures	Med. & thermo-Atl. Halophilous scrub	Atlantic salt meadows	Spartina swards	In/Out	Relevant Attributes
Surface feeding birds Estuarine birds	Meditteranean and thermo-Atlantic halophilous scrubs Atlantic salt meadows Spartina swards	Abrasion/disturbance of the substrate on the surface of the seabed				Out	N/A
		Changes in suspended solids (water clarity)				Out	N/A
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion				Out	N/A
		Removal of non-target species				Out	N/A
		Removal of target species				Out	N/A
		Smothering and siltation rate changes (Light)				Out	N/A
		Visual disturbance				Out	N/A
		Above water noise				Out	N/A
		Collision ABOVE water with static or moving objects not naturally found in the marine environment				Out	N/A
		Collision BELOW water with static or moving objects not naturally found in the marine environment				Out	N/A
		Deoxygenation		NS	NS	Out	N/A
		Hydrocarbon and PAH contamination		NS	NS	Out	NN
		Introduction of light				Out	N/A
		Introduction of microbial pathogens				Out	N/A
		Introduction or spread of invasive non-indigenous species				Out	N/A
		Litter		IE	IE	Out	N/A
		Nutrient enrichment		NS	NS	Out	N/A

-		Organic enrichment		S	S	Out	N/A
		Physical change (to another sediment type)			S	In	Supporting habitat: extent and distribution of supporting non-breeding habitat; Supporting habitat: extent and distribution of supporting habitat for the breeding season
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)		NS	NS	Out	N/A
		Transition elements and organo-metal (e.g. TBT) contamination		NS	NS	Out	N/A
		Underwater noise changes				Out	N/A

Feature	Supporting Habitat	Pressures	Intertidal mixed sediments	In/Out	Relevant Attributes
Surface feeding birds Estuarine birds	Intertidal mixed sediments	Abrasion/disturbance of the substrate on the surface of the seabed	S	In	No relevant attributes.
		Changes in suspended solids (water clarity)	S	Out	N/A
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	S	In	No relevant attributes.
		Removal of non-target species	S	In	Supporting habitat: food availability within supporting habitat (avocet); Supporting habitat: food availability within the intertidal (Black-tailed godwit; Shelduck)
-		Removal of target species	NA	Out	N/A
-		Smothering and siltation rate changes (Light)	S	Out	N/A

		Visual disturbance		Out	N/A
		Above water noise		Out	N/A
		Collision ABOVE water with static or moving objects not naturally found in the marine environment		Out	N/A
		Collision BELOW water with static or moving objects not naturally found in the marine environment		Out	N/A
		Deoxygenation	S	Out	N/A
		Hydrocarbon and PAH contamination	NS	Out	N/A
		Introduction of light	IE	Out	N/A
		Introduction of microbial pathogens	S	Out	N/A
		Introduction or spread of invasive non-indigenous species	S	Out	N/A
		Litter	NA	Out	N/A
		Nutrient enrichment	NS	Out	N/A
		Organic enrichment	NS	Out	N/A
		Physical change (to another sediment type)	S	Out	N/A
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NS	Out	N/A
		Transition elements and organo-metal (e.g. TBT) contamination	NS	Out	N/A
		Underwater noise changes		Out	N/A
Feature	Supporting Habitat	Pressures	Intertidal mud	In/Out	Relevant Attributes
Surface feeding birds Estuarine birds	Intertidal mud	Abrasion/disturbance of the substrate on the surface of the seabed	S	In	No relevant attributes.
		Changes in suspended solids (water clarity)	S	Out	N/A
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	S	In	No relevant attributes.

		Removal of non-target species	S	In	Supporting habitat: food availability within supporting habitat (avocet); Supporting habitat: food availability within the intertidal (Black-tailed godwit; Shelduck)
-		Removal of target species	NA	Out	N/A
-		Smothering and siltation rate changes (Light)	S	Out	N/A
		Visual disturbance		Out	N/A
		Above water noise		Out	N/A
		Collision ABOVE water with static or moving objects not naturally found in the marine environment		Out	N/A
		Collision BELOW water with static or moving objects not naturally found in the marine environment		Out	N/A
		Deoxygenation	NS	Out	N/A
		Hydrocarbon and PAH contamination	NS	Out	N/A
		Introduction of light	NS	Out	N/A
		Introduction of microbial pathogens	S	Out	N/A
		Introduction or spread of invasive non-indigenous species	S	Out	N/A
		Litter	NA	Out	N/A
		Nutrient enrichment	NS	Out	N/A
-		Organic enrichment	NS	Out	N/A
		Physical change (to another sediment type)	S	Out	N/A
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NS	Out	N/A
		Transition elements and organo-metal (e.g. TBT) contamination	NS	Out	N/A
		Underwater noise changes		Out	N/A
Feature	Supporting Habitat	Pressures	Intertidal mud and muddy sand	In/Out	Relevant Attributes

Surface feeding birds Estuarine birds	Intertidal mud and muddy sand	Abrasion/disturbance of the substrate on the surface of the seabed	S	In	No relevant attributes.
		Changes in suspended solids (water clarity)	S	Out	N/A
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	S	In	No relevant attributes.
		Removal of non-target species	S	In	Supporting habitat: food availability within supporting habitat (avocet); Supporting habitat: food availability within the intertidal (Black-tailed godwit; Shelduck)
		Removal of target species	NA	Out	N/A
		Smothering and siltation rate changes (Light)	S	Out	N/A
		Visual disturbance	NA	Out	N/A
		Above water noise		Out	N/A
		Collision ABOVE water with static or moving objects not naturally found in the marine environment		Out	N/A
		Collision BELOW water with static or moving objects not naturally found in the marine environment		Out	N/A
		Deoxygenation	S	Out	N/A
		Hydrocarbon and PAH contamination	NS	Out	N/A
		Introduction of light	S	Out	N/A
		Introduction of microbial pathogens	S	Out	N/A
		Introduction or spread of invasive non-indigenous species	S	Out	N/A
		Litter	NA	Out	N/A
		Nutrient enrichment	NS	Out	N/A
		Organic enrichment	NS	Out	N/A
		Physical change (to another sediment type)	S	Out	N/A
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NS	Out	N/A

		Transition elements and organo-metal (e.g. TBT) contamination	NS	Out	N/A
		Underwater noise changes		Out	N/A

Advice on Operations Sensitivity Key

SENSITIVITY CATEGORY DESCRIPTION	INTERACTION TYPE	
	DIRECT[1]	INDIRECT[2]
SENSITIVE: The evidence base suggests the feature is sensitive to the pressure at the benchmark. This activity-pressure-feature combination should therefore be taken to further assessment.	S	S*
INSUFFICIENT EVIDENCE TO ASSESS: The evidence base is not considered to be developed enough for assessments to be made of sensitivity at the pressure benchmark. This activity-pressure-feature combination should therefore be taken to further assessment. The best available evidence, relevant to the activity in question, at the time of application, should be sourced and considered in any further assessment.	IE	IE*
NOT ASSESSED: A sensitivity assessment has not been made for this feature to this pressure. However, this activity-pressure-feature combination should not be precluded from consideration. The best available evidence, relevant to the activity in question, at the time of application, should be sourced and considered in any further assessment.	NA	NA*

NOT SENSITIVE AT THE BENCHMARK: The evidence base suggests the feature is not sensitive to the pressure at the benchmark. However, this activity-pressure-feature combination should not be precluded from consideration (e.g. thought needs to be given to activity specific variations in pressure intensity and exposure, in-combination and indirect effects). The best available evidence, relevant to the activity in question, at the time of application, should be sourced and considered in any further assessment.	NS	NS*
NOT RELEVANT: The evidence base suggests that there is no interaction of concern between the pressure and the feature OR the activity and the feature could not interact		

[1] *An activity which exerts pressures that interact with a feature within the spatial and/or temporal footprint of the operation*
[2] *An activity which exerts pressures that interact with a feature not associated with the immediate spatial and/or temporal footprint of the operation*

Risk Profile of Pressures Key

RISK CATEGORY	RECOMMENDATION
High to Medium Risk	Pressure is commonly induced by activity at a level that needs to be considered further as part of an assessment
Low Risk	Unless there are evidence based case or site-specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of an assessment.

Annex 8: Co-Location of Shellfish Dredging and Site Feature(s)/Sub-feature(s)

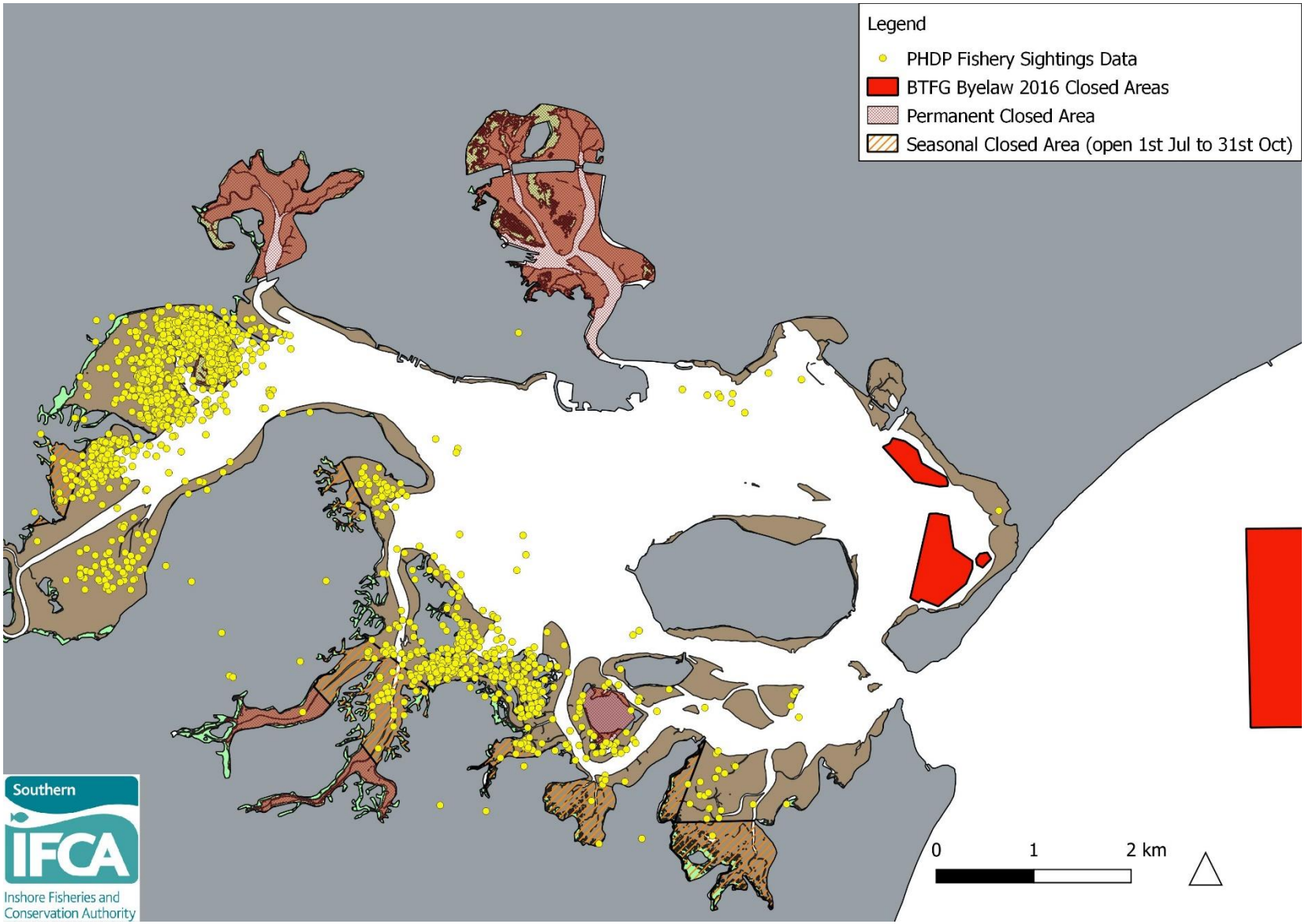


Figure A8: The map shows permit vessel sightings for the 2015/16 to 2022/23 seasons. Prohibited areas, seasonal closed areas and areas of seagrass closed under the Bottom Towed Fishing Gear Byelaw 2016 are also shown (reflects management in place as of 2022/23 season) as well as layers showing supporting habitats for the SPA. Where vessel sightings overlap with seasonal closed areas, all sightings occurred during the period when these areas are open for fishing activity (1st July to 31st October). Note that the closed areas at Seagull Island and Green Island were not in place under permit conditions prior to the 2022/23 season.

Annex 9: Table of studies investigating the impacts of shellfish dredging and recovery rates.

Study	Location and Exposure	Gear Type and Target Species	Sediment Type	Recovery Period	Species-Specific Recovery
Ferns, P.N., Rostron, D.M. & Sima, H.Y. 2000. Effects of mechanical cockle harvesting on intertidal communities. *Journal of Applied Ecology*, 37, 464-474.	Burry Inlet, South Wales	Tractor-towed cockle harvester Common cockle -*Cerastoderma edule*	Intertidal clean sand and muddy sand	Recovery was considered with invertebrate sampling conducted 15 and 86 days after harvesting in both sediment types and 174 days in muddy sand only. Unfortunately sampling was not continued long enough to determine how long invertebrate communities took to recover. Movement of adults or passive transport as a result of sediment movements, was sufficient to allow recovery of modest invertebrate populations in clean sand, but inadequate to allow recovery of large populations in muddy sand. See species-specific recovery.	Muddy sand: *Pygospio elegans* - >174 days *Hydrobia ulvae* - >174 days *Nephtys hombergii* – 51 days *Bathyporeia pilosa* – 51 days *Lanice conchilega* – 0 days *Corophium arenarium* – 0 days *Macoma balthica* - >86 days Cerastoderma edule - >174 days *Pygospio elegans* - >86 days *Crangon creangon* - >86 days *Retusa obtusa* - >86 days Clean sand: *Bathyporeia pilosa* – 39 days *Macoma balthica* - <86 days Cerastoderma edule – 0 days

					Pygospio elegans - >86 days *Nephtys homergii* - <86 days *Carcinus maenas* - <86 days
Kaiser, M.J., Edwards, B. & Spencer, B.E. 1996. Infaunal community changes as a result of commercial clam cultivation and harvesting. *Aquatic Living Resources*, 9, 57-63.	Whitestable, Kent, south-east England	Suction dredge Manila clam – *Tapes philippinarum*	Clay interspersed with patches of shell debris and lignin deposits (from local paper mill) overlaid with fine sand and silt. Exposed to prevailing north easterly winds.	Seven months after harvesting, no significant differences in infaunal communities were found between the harvested clam lay and either of the control sites (near and far). After seven months, sediment fractions in the harvested plot did not significantly differ from the sediment in control areas, as sedimentation had nearly restored sediment structure.	*Nephtys hombergii* contributed to the most similarity between samples taken from the clam lay 7 months after harvesting and was also dominant in control areas.
Hall, S.J. & Harding, M.J.C. 1997. Physical disturbance and marine benthic communities: the effects of mechanical harvesting of cockles on non-target benthic	Auchencairn Bay, Solway Firth, Dumfries, Scotland	Suction dredge & tractor dredge Common cockle – *Cerastoderma edule*	Sediments generally become coarser in the centre of the bay and low water mark (median diameter = 3.5ø, 88μm) (near to the study area). Silt/clay fraction	Suction dredge – statistically significant effects were present, but overall faunal structure in distributed plots recovered after 56 days. This occurred against a background of seasonal response.	Suction dredge - significant treatment (disturbed versus undisturbed) effects were reported for *Pygospio elegans* and *Cerastoderma edule*. There were also a significant time effect and significant time-treatment interaction for *Pygospio elegans*.

infauna. *Journal of Applied Ecology*, 34, 497-517.			(<62.5 μm) ranges from 25 to 60% in the centre.	Tractor dredge – no statistically significant effects on total abundance and number of species and overall faunal structure in distributed plots recovered after 56 days. This occurred against a background of general seasonal decline.	Tractor dredge – mean abundance of *P. elegans* remained higher in the undisturbed treatment until day 56. No significant treatment effect occurred for any species but a significant time treatment occurred for *P. elegans*, *Nepthys* sp. and *C. edule*, with a significant time treatment interaction for *P. elegans*.
Spencer, B.E., Kaiser, M.J. & Edwards, D.B. 1998. Intertidal clam harvesting: benthic community change and recovery. *Aquaculture Research*, 29, 429-437.	River Exe, England (see Spencer *et al*., 1996; 1997)	Suction dredge Manila clam – *Tapes philippinarum*	Unknown – study refers to stable sediment and protection from onshore winds by a sand dune bar.	Recovery of sediment structure and invertebrate infaunal communities occurred 12 months after harvesting. Four months after harvesting, significant differences between the harvested plot, previously net-covered plot and control plot were detectable (67% similarity between treatments), although there were indication of recruitment or migration. Eight months after harvesting, similarity between treatments increased to 85%, however significant	*Pygospio elegans* abundance was greater in the harvested plot than any other four months after harvesting, whilst *Nephtys hombergii* abundance remained lower.

				differences were still apparent between treatment and control plots (excluding previously net-covered plot and the harvested plot). Trenches (10 cm deep) left by suction dredging were infilled within 2 to 3 months.	
Peterson, C.H., Summerson, H.C. & Fegley, S.R. 1987. Ecological consequences of mechanical harvesting of clams. *Fishery Bulletin*, 85, 2, 281-298.	Back Sound, North Carolina, USA	'Clam kicking' – mechanical form of clam harvest involving the modification of boat engines to direct propeller wash downwards to suspend bottom sediments and clams into a plume and collected in a trawl net towed behind the boat. American hard shell clam - *Mercencaria mercenaria*	Seagrass bed and sandflat	Monitored the impact of different intensities of clam kicking, as well as clam raking, for up to four years. Clam harvesting had no impact on the density or species composition of small benthic macroinvertebrates, largely made up of polychaetes. The study concluded that polychaetes recover rapidly from disturbance and as such the communities are unlikely to be adversely affected by clam harvesting.	-

Annex 10: Southern IFCA's Poole Harbour Roosting Sites Code of Practice

Poole Harbour Saltmarsh Protection Code of Practice

Within Poole Harbour, to prevent disturbance to breeding and roosting birds and to protect their supporting habitat, **no person should fish using a dredge within 10 metres of saltmarsh**, as mapped in figures 1 and 2.

EXPLANATORY NOTE

This Code of Practice (CoP) aims to avoid disturbance to breeding and roosting bird species and promote protection of supporting habitat within specific areas of Poole Harbour. Saltmarsh is a supporting habitat of the Poole Harbour Special Protection Area and is identified as being at risk. Dredge fishing over saltmarsh will likely lead to the erosion of this habitat. The Authority has a duty under the Conservation of Habitats and Species Regulations 2019, to ensure that fishing activity does not disturb or have an adverse effect on the wildlife for which a site in the National Site Network is legally protected. This CoP was developed as a first alternative to statutory measures. Where there is evidence of immediate risk to the habitat, statutory measures, in the form of Poole Harbour Dredge Permit Conditions, have been developed to protect areas of saltmarsh around Green Island and Seagull Island. This CoP will be reviewed at least annually and, should the CoP prove ineffective, Southern IFCA will consider the introduction of statutory measures. To further reduce the risk of disturbance to bird species, fishers are advised to avoid these areas of saltmarsh between fishing activities and to avoid the use of excessive noise when close by.

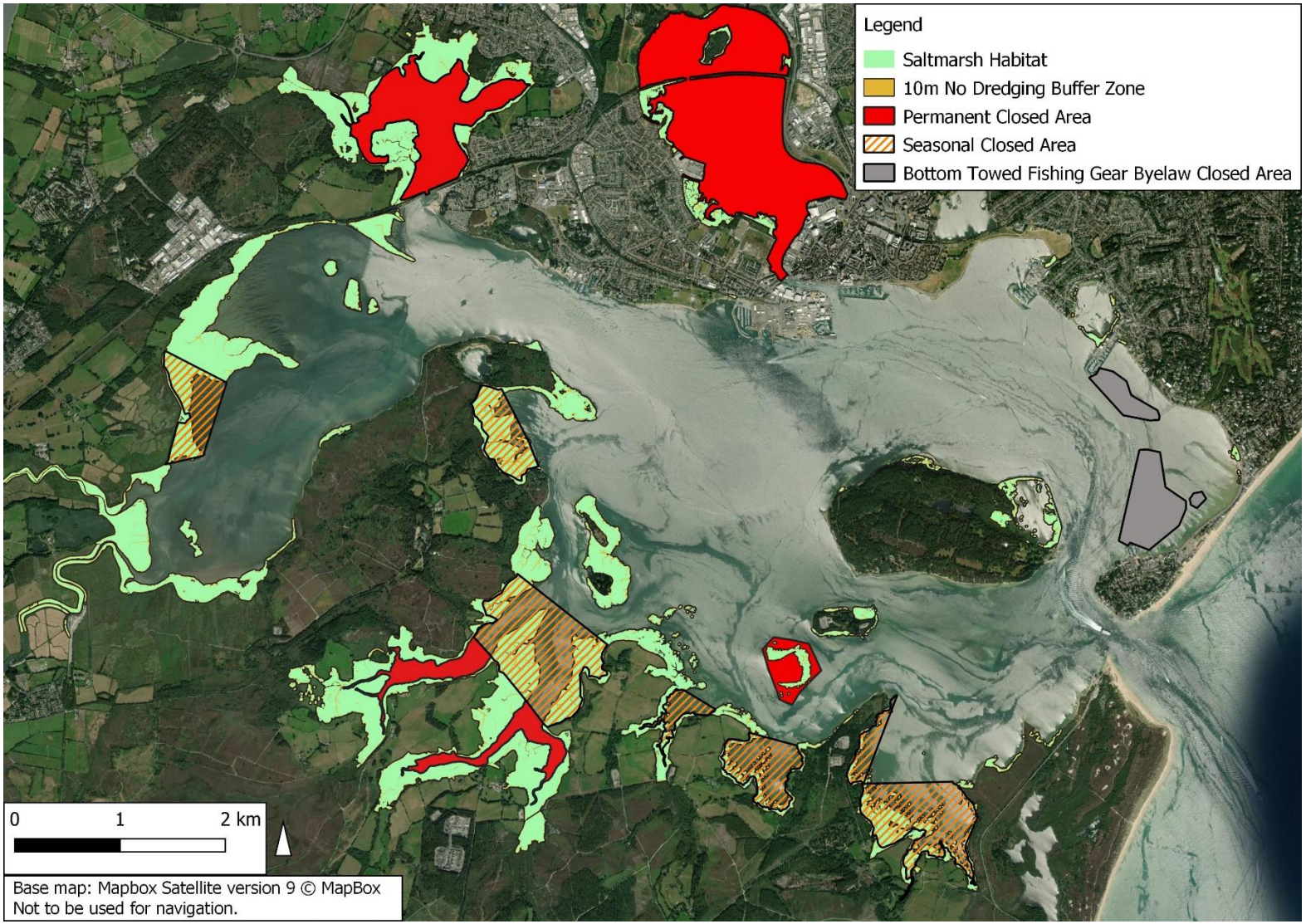
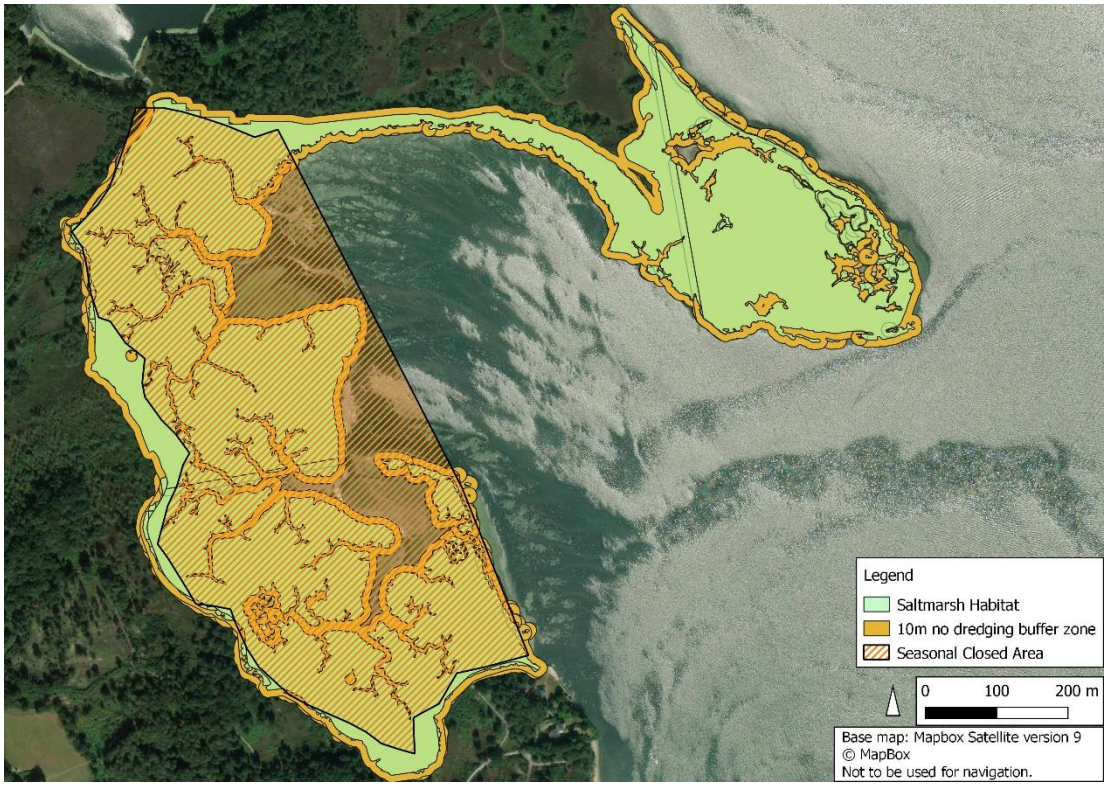


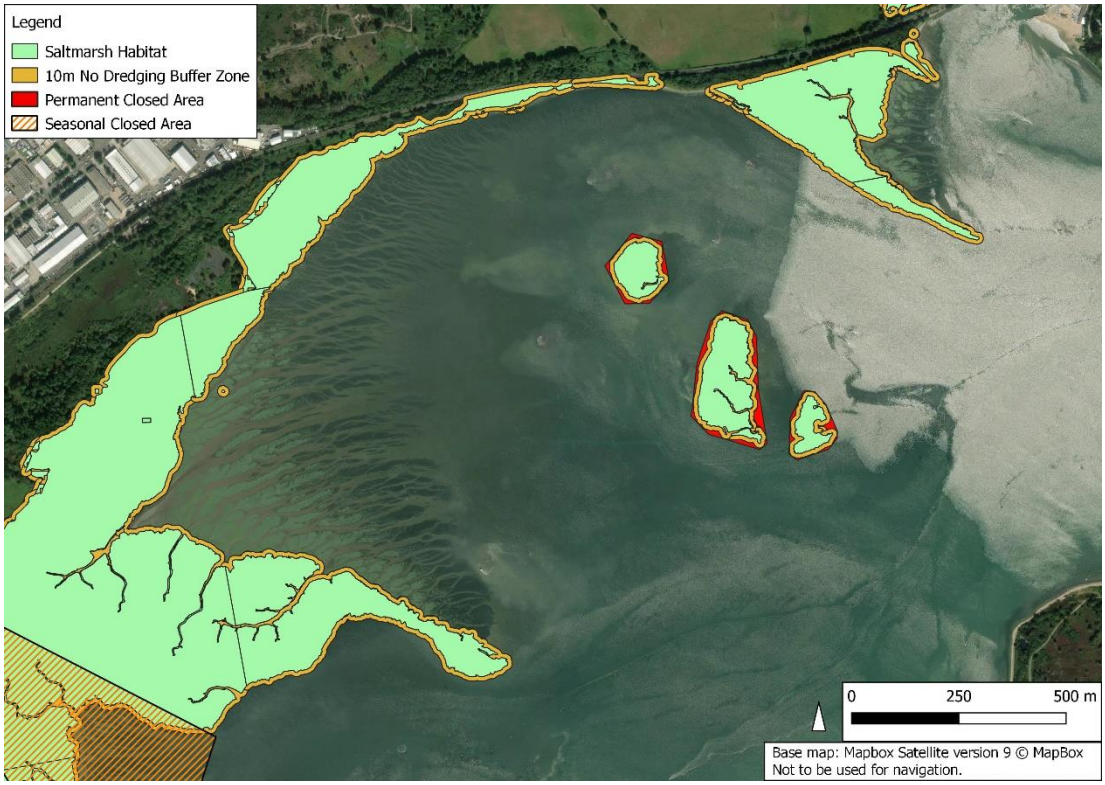
Figure 1: Saltmarsh in Poole Harbour with a 10m buffer zone, also shown are regulations under the Poole Harbour Dredge Permit and the Bottom Towed Fishing Gear Byelaw 2016.

Figure 2: Key areas where saltmarsh habitat is found in Poole Harbour and the 10m no dredging zone. Note that this 10m no dredging zone applies to all saltmarsh in Poole Harbour, the following maps are provided to aid fishermen in areas where fishing activity occurs in proximity to saltmarsh areas

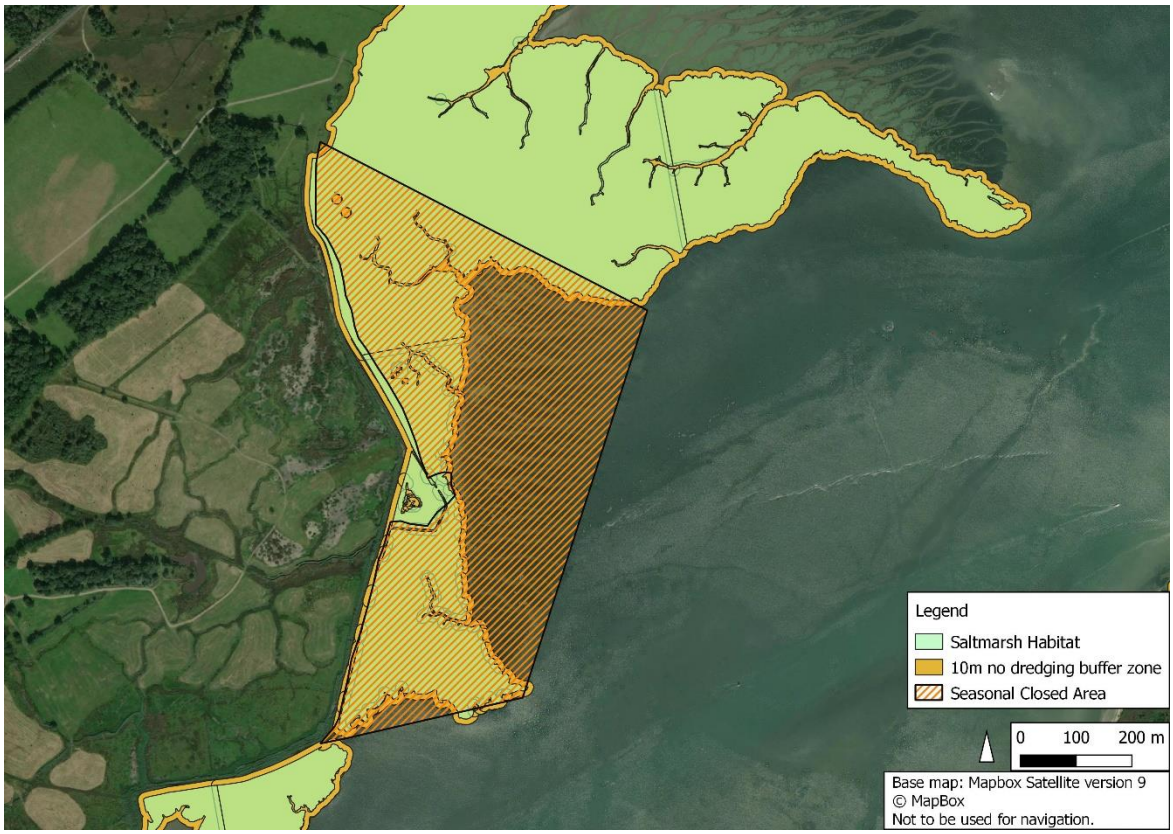
Arne Bay



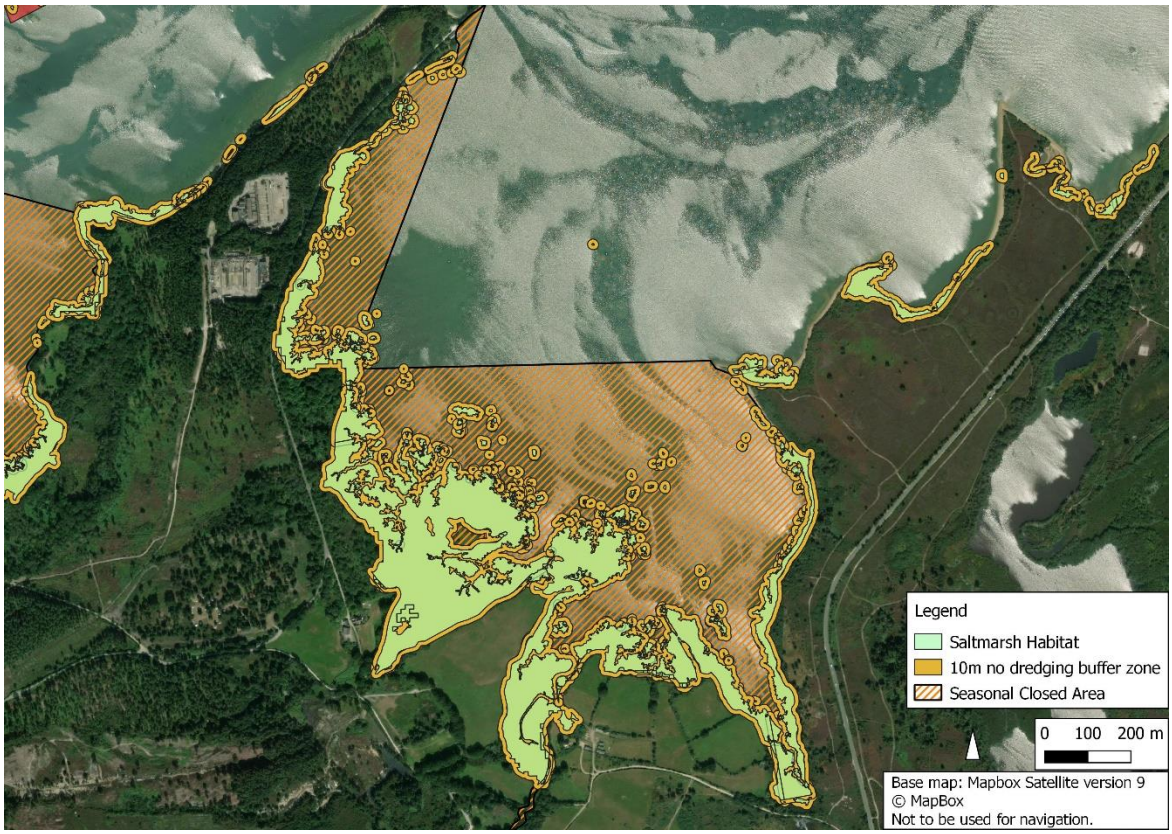
Holton Mere



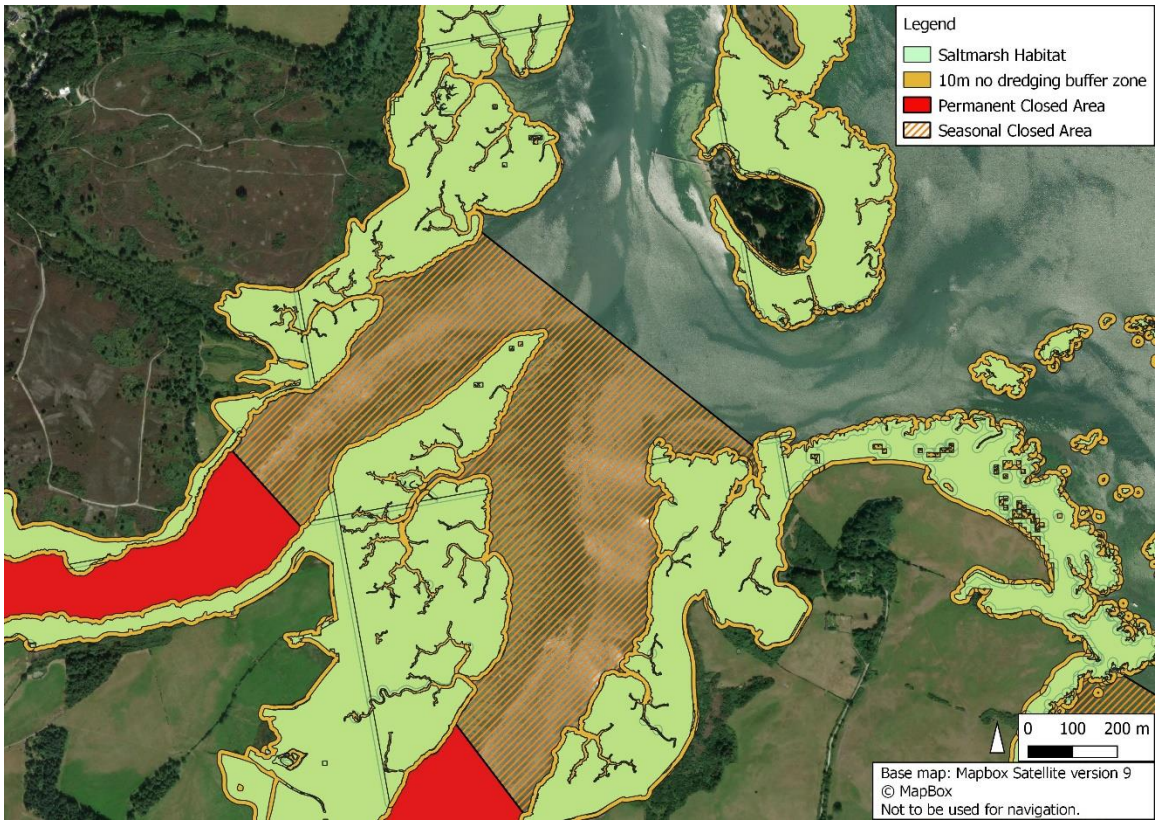
Keysworth



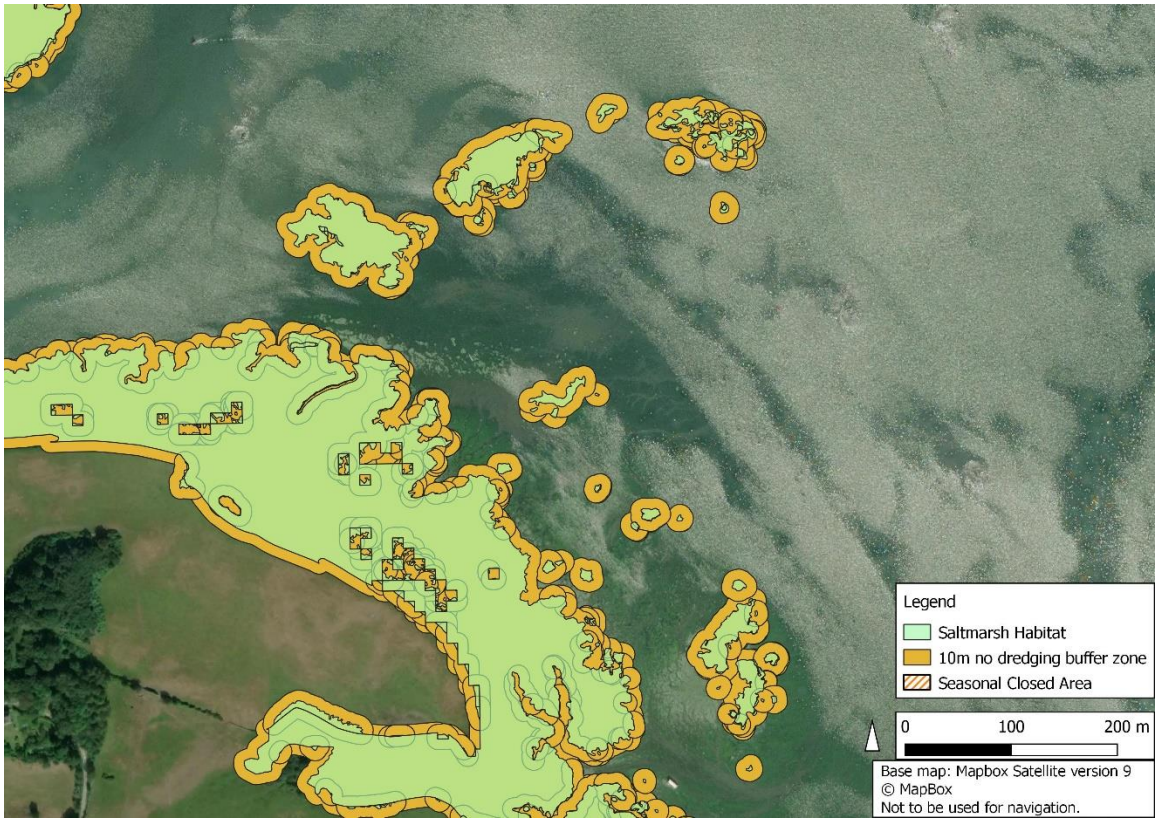
Brands Bay



Wych Lake and Middlebere Lake



The Wards



Southern Inshore Fisheries and Conservation Authority

Marked C

OFFICER'S REPORT

WRASSE FISHERY HRA

Report by Project Officer Smith

A. Purpose of the Report

To receive an update following a review of the Studland to Portland SAC Wrasse Fishery Habitats Regulations Assessment (HRA), and the relevance of these outcomes for the management of the wrasse fishery for the forthcoming 2023-2024 season.

B. Recommendation

1. That Members consider the updated Studland to Portland SAC Wrasse Fishery Habitats Regulations Assessment (HRA), which concludes no adverse effect.

2. That the wrasse fishery continues to be managed in accordance with the Studland to Portland Special Area of Conservation (SAC) – Monitoring & Control Plan for the forthcoming 2023 season.

C. Annexes

1. Studland to Portland SAC Wrasse Fishery Habitats Regulations Assessment (includes Monitoring and Control Plan as Annex 2, pages 45-62).

2. Natural England Formal Advice on the HRA, dated 24th January 2023.

1. Background

1.1. The Southern IFCA wrasse fishery supplies live wrasse to UK Salmon farms for use as natural sea lice control. In the District, wrasses are removed from the Weymouth and Portland area, in and around the Studland to Portland Special Area of Conservation (SAC).

1.2. In accordance with requirements under the Conservation of Habitats and Species Regulations, the fishery has been assessed through two Habitats Regulations Assessments (HRA), for trap and rod and line fishing, in order to ensure the activity does not lead to an adverse effect on site integrity.

1.3. The wrasse fishery is managed through voluntary 'Wrasse Fishery Guidance' which encompasses a wide range of management measures. Annually, the fishery is monitored in accordance with the Studland to Portland SAC Monitoring and Control Plan (M&CP). In addition, the fishery is managed under the Southern IFCA Minimum Conservation Reference Sizes (MCRS) Byelaw, specific to each wrasse species.

Southern Inshore Fisheries and Conservation Authority

OFFICER'S REPORT

2. The Studland to Portland SAC Monitoring and Control Plan

2.1. The M&CP contains eight Monitoring Variables (page 26 of the HRA), each with associated trigger points, which cover a range of parameters including landings, fishing effort, compliance, and new evidence.

2.2. During the 2022 season, Monitoring and Control Variable 1 was triggered. A total of 42,296 wrasse were landed, which represents 1,261 fish (3.1%) above the trigger point set at 41,035 (2018 baselines).

2.3. Following a breach of a trigger point, it was agreed by Members of the Technical Advisory Committee (TAC) in November 2022, that, in accordance with the Assessment Feedback Process, as defined in Annex 2 of the M&CP (page 58), that the Wrasse HRA becomes subject to a review.

3. Reviewing the Studland to Portland SAC HRA

3.1. The pressures 'removal of target species' and 'abrasion/disturbance to the surface of the seabed (pot fishing only)', were screened in for further assessment at the TLSE stage. These pressures were assessed through the Appropriate Assessment in terms of their impact upon the following attributes of the Studland to Portland SAC reef features:

- Structure: species composition of component communities
- Structure and function: presence and abundance of key structural and influential species
- Distribution: presence and spatial distribution of biological communities.

3.2. A review of evidence considered the impacts of pot fishing on temperate rocky habitats which showed that, at low intensity levels, the impacts are negligible or limited in extent (Rees et al., 2018) and similar reef areas are achieving the conservation objective of maintain, despite potting activity (Start Point to Plymouth Sound and Eddystone SCI). Only one fishing vessel uses the maximum of 80 pots under the voluntary 'Wrasse Fishery Guidance' within the SAC, for just four months each year, in a small area of the site. Therefore, it was concluded that the wrasse fishery, through pot fishing, will not be having a significant effect on the site through the pressure abrasion/disturbance to the surface of the seabed.

3.3. The removal of wrasse directly as a target species was concluded to not be relevant to the HRA (as was the case when the Assessments were originally carried out) because the species are not a designated feature of the site, nor are they described as key characteristic or functional species. However, the review of evidence in the Assessment did consider the indirect effects of the removal of wrasse as an epibenthic grazer, controlling grazing invertebrates which in turn allows algal biomass to increase or remain stable. Changes in this functioning has the potential to affect several of the characterising biotopes found in the site which are dominated by red seaweed and kelp species. In addition, the impact of removal of wrasse was considered in the context of their facultative cleaning behaviour of other fish.

3.4. When the following information was considered, it was concluded that at **its current effort, scale, and location, and with the current management and monitoring measures, the wrasse fishery will not lead to an adverse effect on the site integrity of the Studland to Portland SAC:**

- The dominant species targeted are Ballan wrasse and Corkwing wrasse, with the majority of Goldsinny and Rock Cook, and all Cuckoo wrasse being returned to the sea and able to continue their functional role.
- Minimum and maximum sizes ensure a proportion of the targeted wrasse species at a balanced sex ratio remain in the population. Compliance with these measures is excellent.
- Analysis of Landings Per Unit Effort data does not suggest wrasse stocks are in decline.
- A voluntary closed season, network of closed areas, maximum fishing depth, maximum pot number and weather restrictions ensure that fishing occurs for only four-months of the year, in only a small percentage of the SAC. Catch returns indicate that the majority of fishing occurs outside of the SAC in areas such as Portland Harbour and Balaclava Bay.
- Whilst the industry demand trigger was reached in 2022 (monitoring variable one in the M&CP), at this time no evidence is available to suggest that the fishery is having a negative impact on the SAC. The fishery continues to be controlled by several management measures and is monitored through the Monitoring and Control Plan.

3.5. Formal Advice was sought from Natural England on the Studland to Portland SAC Wrasse Fishery HRA. A Formal Advice letter was received on 24th January 2023 (Annex 2). In the Formal Advice NE indicated that they agree with the conclusions of the HRA in that the fishery alone or in-combination is not having an adverse effect on the site integrity of the Studland to Portland SAC. Southern IFCA recognise that other points have been raised in this Formal Advice letter regarding concerns around certain aspects of the fishery and will consider these through the iterative management process applied to this fishery as outlined in Section 4 of this report.

4. Assessment Feedback Process

4.1. In line with the Assessment Feedback Process outlined in Section 8 of the Studland to Portland Special Area of Conservation (SAC) – Monitoring & Control Plan – Wrasse Fishing, the conclusion of no adverse effect on site integrity results in the next step being to continue to undertake monitoring activities for the fishery as outlined in the M&CP.

4.2. Southern IFCA is aware that the evidence used to inform this assessment, whilst currently the best available, does not have high confidence levels. In addition, Southern IFCA is aware that some aspects of the Wrasse Fishery Guidance may not be being fully adhered to by all fishers (catch return forms and pot limit), however further evidence is required to support whether this is the case, for pot limits in particular, and officers have already been working with stakeholders to try and address any issues.

4.3. Southern IFCA also recognises concerns raised by some stakeholders regarding the impact of the fishery and that further evidence on the fishery and its relationship to the marine environment is likely to be forthcoming in 2023, for example through the results of a PhD project studying wrasse biology and fisheries which is currently underway, with results anticipated in 2023.

4.4. It is therefore identified that Southern IFCA, in managing the wrasse fishery in line with the outcomes of the re-assessed HRA, will continue to monitor the fishery as described in the Monitoring and Control Plan for the 2023 season, including keeping up to date with any new external evidence which becomes available which may help inform future management of the fishery and associated monitoring.

4.5. Southern IFCA will utilise available data and, if identified to be required during the 2023 season, consider further evidence gathering opportunities (resource permitting) to improve the monitoring of this fishery which may include identifying if a re-evaluation of the appropriateness of the monitoring variables and trigger levels (which were set according to 2018 baseline data) is required, to ensure that appropriate data can continue to be collected to inform the sustainable management of the fishery.

LOCAL GOVERNMENT (ACCESS TO INFORMATION) ACT 1985

List of Background Papers

The following papers are available online at: Live Wrasse : Southern IFCA (southern-ifca.gov.uk)

Gravestock, V. 2018. HRA – Studland to Portland SAC – Fish Traps. Southern Inshore Fisheries and Conservation Authority, Poole.

Smith, C. 2019. HRA - Studland to Portland SAC – Handlines. Southern Inshore Fisheries and Conservation Authority, Poole.

Southern IFCA Studland to Portland SAC – Monitoring and Control Plan – Wrasse Fishing. 2019 available at: Live Wrasse : Southern IFCA (southern-ifca.gov.uk)

Previous Wrasse fishery Monitoring and Control Reports available at: Live Wrasse : Southern IFCA (southern-ifca.gov.uk)

Document Control

MARKED C – ANNEX 1

Title	**HRA – Studland to Portland SAC – Wrasse Fishery Reassessment 2022**
SIFCA Reference	HRA/02/004
Author	C Smith
Approver	
Owner	Southern IFCA
Template Used	HRA Template v1.2

Revision History

Date	Author	Version	Status	Reason	Approver(s)
10/11/2022	C Smith	1.0	Draft		
10/11/2022	C Smith	1.1	Draft	Additions of info regarding pot/trap fishing	
14/11/2022	C Smith	1.2	Draft		
15/11/2022	C Smith	1.3	Draft		
16/11/2022	C Smith	1.4	Draft		
18/11/2022	C Smith	1.5	Draft		
28/11/2022	C Smith	1.6	Draft	Conclusions following Discussion with DCO	
19/12/2022	C Smith	1.7	Final Draft	DCO Comments addressed	

This document has been distributed for information and comment to:

Title	Name	Date sent	Comments received

Southern Inshore Fisheries and Conservation Authority (IFCA)

Fisheries in EMS Habitats Regulations Assessment for amber and green risk categories

European Marine Site: Studland to Portland SAC

Feature: Reefs

Site Specific Sub-Feature(s): Infralittoral Rock

Gear type(s) Assessed: Fish Traps and Handlines

Summary

A fishery for live wrasse developed in 2015/2016, a portion of which occurs within the Studland to Portland SAC. Initially, pot/traps were used to catch wrasses, so this method was assessed under the Habitats Regulations Assessment (HRA) Process in 2017 and, concluded no adverse effect on the SAC. In 2018, there was a shift in fishing practice from pots/traps to handline fishing, in response to the introduction and adoption of Southern IFCA's Wrasse Fishery Guidance measures. In early 2019, the fishery was again assessed this time for handlines, under the HRA process and concluded no adverse effect on the SAC. Since then, the fishery has fluctuated between pot and handline dominated activity. Ballan and corkwing wrasse are the main target species with small quantities of goldsinny and rock cook also retained. Ten commercially licenced vessels are active in the fishery, between 1st July and early November each year. The pot fishery occurs almost entirely outside the SAC, in and around Portland Harbour and Weymouth Bay, whilst most handline fishing occurs inside the SAC off Portland Bill. Wrasse are targeted in waters approximately 10 meters or less in depth, over infralittoral rock typically characterised by heavy kelp and seaweed cover.

The wrasse fishery is subject to a Monitoring and Control Plan that describes several variables which are monitored each season against set trigger levels. If a variable reaches its trigger point, then the next step in the assessment feedback process is for the fisheries HRA to be re-assessed. In 2022, the wrasse fishery reached the Monitoring Variable 1 trigger level (industry demand), and removed 42,296 wrasses throughout the fishing season (29% above the trigger level of 41,031). This required reassessment of the HRA.

The potential pressures likely to be exerted by the wrasse fishery, upon the designated features, were identified as 'removal of target species' (pot/traps and handlines) and 'abrasion/disturbance of the surface of the seabed (pot/traps only).' All other pressures were screened out at the TLSE stage and therefore required no further assessment.

With regards to abrasion/disturbance…of the seabed, research into the impacts of potting on temperate rocky habitats has shown that, at low intensity levels, the impacts are negligible or limited in extent. Only one fishing vessel uses a maximum of 80 pots within the SAC, for just four months each year, in a small section of the site. Therefore, it was concluded that the wrasse fishery will not lead to a significant effect on the site through the pressure abrasion/disturbance…of the seabed.

The removal of target species will directly impact wrasse populations which has the potential to lead to indirect impacts on the wider ecosystem. Wrasse species are not listed as features of the site or, as key or influential species within the Conservation Advice Package. Therefore, the direct impacts on wrasse populations in isolation are not considered relevant in the context of this assessment. Only the indirect effects from the removal of the species are considered.

There is a lack of evidence on ecological function of wrasse species and the impacts of their removal on temperate reef habitats, and so, best available evidence was used to infer potential impacts. This highlighted potential concerns around the removal of wrasse as an epibenthic grazer (of small algal grazing invertebrates) and subsequent changes in algal biomass, as well as, the role of wrasse as facultative cleaners, removing parasites off other fishes.

The wrasse fishery is managed through many statutory and non-statutory measures. Statutory minimum sizes apply for each of the species. Under the Wrasse Fishery Guidance, non-statutory maximum conservation reference sizes, a closed season, no take and no pot areas, pot effort limitation, maximum depth, and data submission requirements also apply and, as such the fishery is subject to one of the largest combinations of measures in the Southern IFC District. In addition, the fishery is monitored each season according to the SAC Monitoring and Control Plan. These measures aim to ensure the long-term sustainability of the fishery through preventing over-exploitation of wrasse populations. This will also benefit the wider ecosystem by ensuring a background population of both small and large wrasses remain within the fished area, whilst unfished areas within the SAC can act as zones from which wrasse populations can spill over and replenish harvested stocks, to ensure that wrasses continue to exhibit top-down control on grazers and fulfil their role as facultative cleaners. The analysis of a five-year, Landings Per Unit Effort data time-

series for the fishery as a whole (across the whole fished area), does not suggest that landings of wrasses are declining.

Based on the points outlined in this summary and explored throughout this assessment, it was concluded that the wrasse fishery is not occurring at a level significant enough to have an adverse effect on site integrity and, is therefore not considered to hinder the site from achieving its conservation objectives.

Contents

1 Introduction

1.1 Need for an HRA assessment

The National Site Network[1] is a network of protected sites which are designated for rare and threatened species and rare natural habitat types. These sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA), designated under the EC Habitats Directive 1992 and EC Birds Directive 2009 (amended), respectively. The Conservation of Habitats and Species Regulations 2017[2], as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[3], transposes the land and marine aspects of the Habitats Directive and the Wild Birds Directive into domestic law, and outlines how the National Site Network will be managed and reflect any changes required by EU Exit.

Southern IFCA has duties under Regulation 9 of the Conservation of Habitats and Species Regulations 2017 as a competent authority, with functions relevant to marine conservation, to exercise those functions to secure compliance with the Habitats Directive and Birds Directives.

Article 6(3) of the Habitats Directive requires any plan or project likely to have a significant effect on a European site (SPA or SAC) within the National Site Network, either individually or in combination with other plans or projects, to undergo an Appropriate Assessment to determine its implications for the site.

Article 4(4) of the Birds Directive states that 'Member states shall take appropriate steps to avoid …deterioration of habitats or any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article'.

Regulation 63 of the Conservation of Habitats and Species Regulations 2017 requires Southern IFCA, as the competent authority, to make an appropriate assessment of a plan or project which is likely to have a significant effect on a European site that forms part of the National Site Network (either alone or in combination with other plans or projects) and is not directly connected with or necessary to the management of the site in question. The implications of any plan or project must be assessed in view of the site's conservation objectives.

A new fishery for live wrasse, emerged during 2015-16. The fishery occurs within and around the Studland to Portland SAC. Previously the fishery was assessed for the activity of using fish traps. Following a change in fishing method the fishery was assessed again for handline activity. Both assessments concluded that the activities would not cause an adverse effect upon the site due to the introduction of Wrasse Fishery Guidance Measures and a Monitoring and Control Plan.

The monitoring and control plan requires several variables of the fishery to be monitored, For example, wrasse fishery demand, Landings Per Unit Effort, fishing effort etc...(see section 5.6 for full details). If these variables reach a set trigger level, established based on an understanding of the fishery in 2018, there is an assessment feedback process which should be followed. The first step in this feedback process differs depending on which monitoring variable is triggered, for repeated non-compliance with the fishery guidance measures, the next stage is a review of management. For all other monitoring variables, the next stage is a re-assessment of the HRA for the fishery (Annex 2). In 2022, Monitoring Variable 1 – Industry demand was triggered, as the demand for wrasse superseded the 2018 baseline level by more than 25% (42,296 fish were landed - an increase of 29%).

Therefore, in conjunction with the Monitoring and Control Plan Assessment Feedback Process, Southern IFCA is carrying out this updated wrasse fishery assessment to assess whether in the view of Southern IFCA, the fishing activity will have a likely significant effect on Reef features of the Studland to Portland SAC, alone, and in combination with other plans or projects. The assessment ensures Southern IFCA meets its responsibilities as a competent authority by making sure that the conservation objectives of the Studland to Portland SAC will be met and the integrity of the site is not adversely affected.

1.2 Documents reviewed to inform this assessment

- Natural England's risk assessment Matrix of fishing activities and European habitat features and protected species[1]
- Reference list (Annex 1)
- Natural England's Conservation Advice (March 2022)[2]
- Site map(s) – sub-feature/feature location and extent (Annex 3)
- Fisheries Impact Evidence Database (FIED)
- Marine Life Information Network[3]

2 Information about the site

- Studland to Portland Special Area of Conservation (UK0030382)

2.1 Overview and qualifying features

- **Reefs.**
  - Infralittoral rock
  - Circalittoral rock
  - Subtidal stony reef

Please refer to Annex 3 for a site feature map.

Studland to Portland SAC lies off the south coast of Dorset and contains numerous areas of reef in many forms, which exhibit a large amount of geological variety and biological diversity. Features of particular interest within the Studland Bay to Ringstead Bay area include a series of limestone ledges (up to 15m across) protruding from shelly gravel at Worbarrow Bay, which support a rich sponge and sea fan community; dense brittle star beds (*Ophiothrix fragilis*) on shale reefs extending from Kimmeridge; a unique reef feature, known as St Albans ledge, extending out over 10km offshore and subject to strong tidal action; and an area of large limestone blocks known as the "seabed caves". The Portland Reefs are characterised by flat bedrock, limestone ledges (Portland stone), large boulders and cobbles. On the western side of Portland Bill, rugged limestone boulders provide deep gullies and overhangs. Mussel beds (*Mytilus edulis*) are found to occur in extremely high densities on bedrock associated with strong currents to the southeast of Portland Bill.

2.2 Conservation Objectives

The site's conservation objectives apply to the site and the individual species and/or assemblage of species for which the site has been classified (Qualifying features: Reefs).

The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of the qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of the qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species
- The distribution of qualifying species within the site

[1] See Fisheries in EMS matrix: http://www.marinemanagement.org.uk/protecting/conservation/documents/ems_fisheries/populated_matrix3.xls
[2] Studland to Portland SAC Marine site detail (naturalengland.org.uk)

[3] MarLIN - The Marine Life Information Network - Home

3 Fishery Information

3.1 Summary of Fishery

During 2015-16, a fishery for live wrasse developed within the Southern IFC District, with removal partially taking place inside the Studland to Portland SAC. Wrasse are used as cleaner fish in Scottish salmon farms to remove sea-lice as a biological alternative to the use of anti-parasitic chemical treatments. Wrasse are targeted using both static pot trapping and using handlines. The pot fishery was assessed under Article 6.3 in 2017. Later in 2019, following a shift from pot to handline fishing, the fishery was assessed for handline activity. Since then, the fishery has fluctuated between being pot dominated and handline dominated.

Considering the drive for this assessment being due to the trigger of a variable unrelated to fishing method, this assessment focusses on the entire wrasse fishery, considering both gear types. The fishery operates on a seasonal basis. The season does not commence until July due to the closed season described in the Wrasse Fishery Guidance. Typically, the fishery runs until late October or early November dependent upon the weather and demand for wrasse.

3.2 Technical Gear Specifications

Wrasse are targeted using fish pots/traps and handlines (rod and line).

Pots/traps

Wrasse are often targeted using traps, typically baited with shore crab (*Carcinus maenas*). The traps are commonly shot in short strings, with several traps attached to one long rope which is laid on the seabed and marked at one end with a buoy. An anchor may also be attached to one or both ends of the rope. Traps will often be soaked for between 24 to 48 hours.

The traps used to catch wrasse are typically constructed of 7 mm plastic coated steel wire and covered with small meshed eel-netting, black in colour. The size and shape of the traps may vary, but typically measure 28”L x 16”W x 11”H and weight approximately 4 kg. The outside edges are wrapped with rope to protect the pot from damage through abrasion on the seabed (Figure 1). Due to the lightweight nature of the traps, most fishers have fitted a metal frame to each trap to protect it from damage (Figure 1). With the addition of this metal frame, traps weigh approximately 15 kg. The position of entrances (typically two) are located on the sides of the traps and have a tapered netting entrance held open with a ring. The end or side of the trap is hinged to allow the removal of catch and bait replacement.

Figure 1. Fish trap used to catch wrasse (left) and fish trap fitted with metal frame and escape gaps (right).

Handlines

Typically, size 4 barbless hooks are baited with ragworm (*Hediste diversicolour*). A single boat often operates two handlines during a fishing trip. Fishing for wrasse is carried out whilst the boat is drifting with the currents (not whilst anchored).

3.3 Effort, Scale and Area of Fishing Activities

Throughout 2015 and 2016 a new fishery evolved in which static fish traps were used to trap live wrasse. Up to and including 2017 fishing predominantly took place between April and October with a maximum of ten known participants, all using vessels measuring eight meters or less in length. In 2017, during the development of Fishery Guidance Measures, some participants trialled the use of handlines as their predominant fishing method to catch live wrasse. The trail was a success and in 2018, a change in the dynamic of the fishery occurred. Precautionary species size limits meant that fish traps were no longer optimal for the capture of ballan wrasse, so over the course of the year most participants switched to using handline methods to catch live wrasse, with a small number using fish traps to target the wrasse 'micro-species'[4]. In addition, the Wrasse Fishery Guidance measures reduced the length of the fishing season, through a closed season from 1st April to 30th June. Since then, the fisheries' dominant fishing method has fluctuated based upon the demand for ballan or micro-wrasse species. Each year, ten vessels under eight meters participate in the fishery.

Fishing activities for wrasse occur in the subtidal, although close inshore, over infralittoral rocky ground typically characterised by kelp and seaweed cover. This represents the favoured habitat for wrasse species. Typically, the activity occurs in waters of 10 meters depth and less, due to the requirement that fish are retained alive and in a healthy state, thereby restricting the depth over which fishers can target the species to prevent barotrauma effects.

Six wrasse species occur along the south coast, previously four of which formed the target species of the fishery. These included Ballan (*Larus bergylta*), Corkwing (*Symphodus melops*), Goldsinny (*Ctenolabrus rupestris*) and Rock cook (*Centrolabrus exoletus*). Ballan wrasse have consistently been the most targeted species due to their survivability and feeding efficiency. Initially, this species was targeted in the size range of 12 to 28 cm. Following, the introduction of the Wrasse Fishery Guidance in June 2017, this size range changed to 18 to 28 cm.

For the other wrasse species, the number of target species has reduced due to a move to a sized-based pricing structure. This has led to significantly fewer rock cook and goldsinny wrasse being removed, because most of the catch of these species, fall in the lower size and price bracket. These fish are returned immediately to the sea.

The numbers of wrasse removed by the fishery, Landings Per Unit Effort, effort data and other variables are discussed in the Monitoring Section 5.5.

4 Test of Likely Significant Effect (TLSE)

The Habitats Regulations Assessment (HRA) is a step-wise process and is first subject to a coarse test of whether a plan or project will cause a likely significant effect on an EMS[5]. Each feature/sub-feature and the associated pressure the activity may pose were subject to a TLSE. The results of the features/ pressure interaction which were screened in for further assessment under an Appropriate Assessment are presented in Table 1 below.

Table 1. Summary of TLSE Assessment for Circalittoral rock; Infralittoral rock; Subtidal stony reef. Note: Only those pressures screened in for further assessment have been included below

Potential Pressures	**Sensitivity**	**Infralittoral Rock**
Abrasion/ disturbance of the substrate on the	S	IN (Pot Fishing), OUT (Handlines) – Pot fishing activity is likely to lead to abrasion of the feature through contact of the pot/rope/anchor with the seabed. Therefore, further assessment is required.

[4] In response, Southern IFCA completed a HRA of handline fishing, which concluded no adverse effect.

[5] Managing Natura 2000 sites: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

surface of the seabed		Handline fishing activity does not lead to Abrasion/disturbance of the seabed because the activity is conducted from vessels which are drifting with the currents. Therefore, no gear contacts the seabed so there is unlikely to be a significant impact.
Removal of target species	S	IN (Pot fishing and Handlines) – The fishery predominantly removes Ballan wrasse, as well as other wrasse species (Corkwing, Goldsinny, Rock cook). Despite being a mobile species, wrasses are known to be year-round residents of shallow rocky areas where there is heavy kelp and seaweed cover. Wrasse species represent important predators, feeding on a variety of invertebrates and form a prey species for other fish and birds. It is recognised that wrasse play an important ecological role in these shallow temperate rocky reef ecosystems and their removal may impact on structure and functioning of associated communities. None of the five wrasse species are described as features of the SAC or as key species in Natural England's Conservation Advice package. Wrasse fishers currently only operate for four months of the year (July to Early November) allowing the fish stocks eight months in which they are not targeted by commercial fishers. Therefore, based on the potential for the removal of wrasse species from the SAC to cause a likely significant effect this pressure has been screened in for the Wrasse fishery for further assessment.

5 Appropriate Assessment

5.1 Co-location of Fishing Activity and Site Features/Sub-feature(s)

Wrasse fishing is concentrated between Portland Bill and Broadbench. Handline fishing occurs mostly off Portland Bill, whilst the majority of pot fishing activity occurs in and around Portland Harbour and Weymouth Bay. This is based upon the locations of fishing activity reported in catch return forms submitted in 2022.

5.2 Potential Impacts

It has been identified that handlining for wrasse has the potential to cause an adverse impact on the features and sub-features of the Studland to Portland SAC through the selective extraction of species. There are several factors that may influence the effect of selective extraction on species and benthic habitats, including the spatial and temporal intensity of handlining, technical gear type (hook type and bait) and the importance of wrasses' ecological roll within the ecosystem.

Scientific research into the effects handline fishing on individual species is vast however little to none has been conducted specifically on wrasse species. As such, results from these studies are indirectly relevant and will be used in this assessment to determine the likely biological disturbance caused by the handline fishery on the SAC features.

5.2.1 Removal of target species

The selective extraction of species refers to the removal of a species or community and includes the removal of a specific species/ community/ keystone species in a biotope. Fishing leads to the removal of certain species from an ecosystem. In the context of this assessment, handlining targets four species of wrasse; Corkwing, Goldsinny, Rock cook and particularly Ballan between 12 and 28 cm in length. The mesh size used in salmon farms means that wrasse less than 10 cm (total length) are not retained and consequently restricts the capture of wrasse to 10 cm or greater (Treasurer, 1996; Varian *et al*., 1996; Sayer *et al*., 1996a).

5.2.1.1 Population effects

The life history characteristics and reproductive strategies employed by each wrasse species is different (Table 2). This is particularly important when considering the potential population impacts of the wrasse fishery, as impacts on each species are likely to differ from one another (Skiftesvik *et al*. 2014). The following section will further explore the individual life history characteristics, reproductive strategies, ecology, and genetics of each species and discuss the potential impacts on each, using scientific literature where available.

Table 2. Summary of the life history characteristics and reproductive strategies employed by five wrasse species which occur on the South Coast, not including Baillon's wrasse.

Characteristic	**Ballan wrasse** *Labrus bergylta*	**Corkwing wrasse** *Symphodus melops*	**Goldsinny wrasse** *Ctenolabrus rupestris*	**Cuckoo wrasse** *Labrus mixtus*	**Rock cook wrasse** *Centrolabrus exoletus*
Maximum age	29 years – Male 25 years – Female (Dipper *et al*. 1977)	9 years – Male (Darwall *et al*. 1992) 7+ years – Female (Sayer *et al*. 1996a)	14 years – Male 20 years – Female (Sayer *et al*. 1995)	20 years (Muus & Nielsen, 1999)	8 years – Male 9 years – Female (Darwall *et al*. 1992; Treasurer, 1994)
Maximum length	65.9 cm (IGFA, 2001)	28 cm (Quignard & Pras, 1986)	21 cm (Halvorsen *et al*. 2016)	40 cm (Bauchot, 1987)	19 cm (Skiftesvik *et al*. 2015)
Age at maturity	6-9 years – Female 6-9 years -Male (Darwall *et al*. 1992)	2-3 years – Female (Darwall *et al*. 1992) 1-3 year – Male (Uglem *et al*. 2000; Matland, 2015*)	2-3 years – Female (Darwall *et al*. 1992) 3 years – Male (Matland, 2015*)	2 years – Female 6-9 years – Male (Darwall *et al*. 1992)	2 years – Female (Darwall *et al*. 1992; Matland, 2015*) 2 years – Male (Matland 2015*)
Size at maturity	16-18 cm – Female 28 cm – Male (Darwall *et al*. 1992)	7-10 cm (Fishbase; Darwall *et al*. 1992)	9.5 cm (Darwall *et al*. 1992) 8 cm – Females	16 cm – Female 24 cm – Male (Darwall *et al*. 1992)	9 cm – Males 8.5 cm – Females (Matland, 2015*)

		9 cm – Female 14 cm – Male (Matland, 2015*)	9 cm – Males (Matland, 2015*)		
Spawning period (Atlantic)	April – August (Darwall *et al*. 1992)	April – September (Darwall *et al*. 1992)	April – September (Darwall *et al*. 1992)	May – July (Darwall *et al*. 1992)	May – August (Darwall *et al*. 1992)
Reproductive strategy	Hermaphrodite (Darwall *et al*. 1992)	Gonochoristic (Darwall *et al*. 1992)	Gonochoristic (Darwall *et al*. 1992)	Hermaphrodite (Darwall *et al*. 1992)	Gonochoristic (Darwall *et al*. 1992)

* Figures reported from Matland (2015) represent 'critical age' and 'critical length' which is the point at which 50% of the sample are sexually mature.

Ballan wrasse

Ballan wrasse attain the greatest size and age of all above-mentioned five wrasse species. The species is a monandric protogynous sequential hermaphrodite, meaning the species starts life as a female and a percentage of which change into male with no sex reversal thereafter (Sjolander *et al*., 1972; Darwall *et al*., 1992; Leclercq *et al*. 2014). Males are territorial and within each territory a dominant male will guard a harem of several females, whom which the male will mate with (Sjolander *et al*., 1972; Hillden, 1984; Darwall *et al*., 1992; Muncaster *et al*. 2010; Leclercq *et al*. 2014). During the spawning period benthic eggs are laid over temporary nests, built by female fish (Hillden, 1984; Darwall *et al*.1992; Muncaster *et al*. 2010).

The change in sex is believed to be driven by social cues (Leclercq *et al*. 2014) and associated with size, although a greater size is not necessarily a prerequisite for sexual inversion (Muncaster *et al*. 2013). When held in captivity, it was observed that the removal of large males induced smaller females within the group to change sex (Halvorsen, 2016). Sexual inversion may also be triggered when a harem of females becomes too large for the male to dominate (Muncaster *et al*. 2013). The size and age at which sex inversion takes place has been reported to occur over a wide range and differs between studies (Table 3) (Villegas-Ríos *et al*. 2013a), with current literature indicating sex change occurs mostly before reaching 40 cm (total length) and not until after 6 years in age (Muncaster *et al*. 2013). Muncaster *et al*. (2013) reported the timing of sexual inversion after the conclusion of the spawning period.

Table 3. Age and size range of sexual inversion in ballan wrasse (Labrus bergylta) from five studies.

Study	**Age Range (years)**	**Size Range (cm)**	**Location**
Quignard, 1966	-	27-41	French side of the English Channel
Dipper *et al*., 1977	5-14	25-43	Isle of Man
Villegas-Ríos *et al*. 2013a	7.4-11.8*	36-47.2*	Galicia, NW Spain
Muncaster *et al*. 2013	-	28-42 (median 36)	Western Norway
Leclercq *et al*., 2014	6-13	28.2-37.2	Scotland & Norway

* This study reports sexual inversion figures for two morphotypes; plain and spotted. Plain individuals were estimated to undergo sex change at 7.4 years and 36 cm and spotted individuals at 11.8 years and 47.2 cm.

Potential implications of removing ballan wrasse of a certain size (12 to 28 cm) can be inferred from life history parameters and existing literature. At the preferred size of removal, a proportion of the individuals (12-18 cm) caught will be female ballan wrasse that have not had the chance to spawn. Individuals from 18-28 cm are likely to be female ballan wrasse who have had the chance to spawn at least once. Based on the reported size range at which sexual inversion occurs (Table 3), most individuals caught are likely to be female with the potential for a small number of males. Muncaster *et al*. (2013) reported 60% of fish caught during the breeding season (late April to June) were female. Leclercq *et al*. (2014) reported a potential trend towards fewer older and larger females which may lead to a phenotypic alteration in the age and size of sexual inversion. The targeting of one sex over another may also lead to potential impacts on breeding and subsequent recruitment (Muncaster *et al*. 2013).

Corkwing wrasse

Corkwing wrasse are a gonochoristic species, meaning the species has distinct sexes which do not change (Dipper & Pullin, 1979; Darwall *et al*., 1992). Male corkwings are very territorial and attract females into their nests, where they may lay batches of eggs (Costello, 1991; Skiftesvik *et al*. 2015). Nests are built by the male corkwing, typically using seaweed in a rock crevice (Costello, 1991). The species has two distinct male strategies; the majority build a complex nest and guard the eggs. A small proportion develop as 'accessory' or 'sneaker' males which mimic females and perform sneak spawning, whereby they pair with a female in a dominant male's territory or join a spawning pair (Warner & Robertson, 1978; Costello, 1991; Uglem *et al*., 2000; Halvorsen, 2016). At the same age, sneaker males are smaller and can make up between 3 and 20% of the population (Uglem *et al*., 2000). Maturation of females tends to occur earlier than in males and because of this, males are typically larger than females of the same age (from 1 to 4 years) (Quignard, 1966; Dipper, 1976; Darwall *et al*., 1992; Treasurer, 1994).

Potential implications of removing wrasse of a certain size (14-22 cm) can be inferred from life history parameters and existing literature. At the preferred size of removal, it is likely that most of both females and males will have had a chance to reproduce before being caught and therefore those being removed are likely to be sexually mature. The reproductive biology of corkwing wrasse (i.e., larger size of nesting males than females and sneaker males) make the species vulnerable to size selective harvest (Darwall *et al*., 1992; Sayer *et al*., 1996a; Uglem *et al*., 2000; Halvorsen, 2016). Halvorsen *et al*. (2016) reported significantly larger body sizes for nesting males than females and sneaker males, with the largest differences in the northernmost populations on the western coast of Norway. This sexual size dimorphism was caused by a fast growth and delayed maturation in nesting males compared to females and sneaker males (Halvorsen *et al*., 2016).

The selective removal of larger fish, most likely to be dominant territorial males, could affect social structure (influence on the frequency of sneaker males), reduce egg survival (through the removal of nest-guarding males), lead to biased sex ratios (in favour of females), and decrease the average size and age at first maturity (Darwall *et al*., 1992; Halvorsen, 2016). Halvorsen *et al*. (2016) reported the 12 cm minimum legal-size limit in Norway led to distinct levels of protection for nesting males, females, and sneaker males due to differences in body size and failed to protect any mature nesting populations in five out of 8 populations. Further investigation by Halvorsen *et al*. (2016) found dominant nesting males to have a higher vulnerability of capture, regardless of body size, with a possible explanation related to physiological or behavioural differences between sexes. Halvorsen *et al*. (2017) also investigated differences in catch per unit effort, size, age, and sex ratio of goldsinny and corkwing wrasse of populations within marine protected areas (MPAs) (not subject to fishing) and control areas (open to fishing). Catch per unit effort of individuals above the minimum size limit was higher in three out of the four MPAs. The relative difference between the two areas ranged from -16% to 92%. The size and age of individuals within MPAs were significantly greater than in control areas. No differences in sex ratio between the two areas were reported.

In the Irish wrasse fishery, Darwall *et al*. (1992), Deady *et al*. (1993) and Varian *et al*. (1996) reported a decline in catch per unit effort (CPUE) for corkwing in years following exploitation (Sayer *et al*., 1996a). More specifically, Darwall *et al*. (1992) reported a reduction in males greater than 13 cm in length in the second year of sampling, potentially suggesting the depletion of large males. Like Halvorsen *et al*. (2016), Darwall *et al*. (1992) noted catches of corkwing were male biased and that males were on average larger than females.

The maximum removal size for corkwing of 14cm in this fishery should ensure a good population of larger sexual mature females and males will remain in the local populations and reduce the likelihood of depletion of either sex.

Goldsinny wrasse

Like corkwing, goldsinny wrasse are a gonochoristic species and have 'accessory' males who mimic females and perform sneak spawning (observed in two thirds of spawning's) (Hillden, 1981; Darwall *et al*., 1992). Although the males maintain territories, spawning occurs within the water column as the eggs of goldsinny wrasse are pelagic, as opposed to benthic eggs of the other temperate wrasse species (Hillden, 1981; Darwall *et al*., 1992). Males will often use their territory to spawn, as well as for foraging (Hillden, 1981).

During the spawning period a single male will spawn with several females, despite a 50:50 sex ratio (Hillden, 1981). Females will then stay within the vicinity of the male's territory with which they have spawned (Hillden, 1981).

Potential implications of removing wrasse of a certain size (12-18 cm) can be inferred from life history parameters and existing literature. At the preferred size of removal, all individuals should have had the chance to reproduce before being caught and therefore all individuals being removed will be sexually mature. Like corkwing wrasse, male goldsinny wrasse tend to grow at a slightly greater rate and size selective harvesting of these individuals is likely to influence age structure and sex ratios (Sayer *et al*., 1996b; Varian *et al*., 1996; Halvorsen *et al*., 2016). However, the cap of 18cm should ensure that a proportion of larger adults remain within the local population.

Halvorsen *et al*. (2017) investigated differences in catch per unit effort, size, age, and sex ratio of goldsinny and corkwing wrasse of populations within MPAs (not subject to fishing) and control areas (open to fishing). Catch per unit effort of individuals above the minimum size limit was 33% to 65% higher in MPAs. Goldsinny were not significantly older or larger within MPAs relative to control areas and no differences in sex ratio between the two areas was reported. Goldsinny is smaller in size, when compared to the other wrasse species, and appears to benefit from the minimum size limit (11 cm), which applies outside of the MPAs.

In the Irish wrasse fishery, Darwall *et al*. (1992) and Deady *et al*. (1993) reported a decline in catch per unit effort (CPUE) for goldsinny in years following exploitation.

Cuckoo wrasse

Cuckoo wrasse are diandric protogynous hermaphrodites (Costello, 1991). This means that only a proportion of females change into males (Costello, 1991). Sexual inversion is associated with a distinct change in colour (Dipper & Pullin, 1979) and is reported to occur after reaching a certain size (Irving, 1998), over four years of age (Costello, 1991) or between 7 and 13 years (Irving *et al*., 1998). Quignard (1966) reported all individuals over 29 cm and 10 years of age to be males. Sex change may also be influenced the sex ratios in the local population, with most having more females than males (Naylor, 2005). Males will build and guard a nest (Costello, 1991).

Potential implications of removing wrasse of a certain size (>10 cm) can be inferred from life history parameters. This species is not targeted and the wrasse fishery guidance states all live Cuckoo wrasse should be returned to the fishery immediately. If the species were targeted the potential implications would be like ballan wrasse. At the current size of removal, a large proportion of individuals (10-16 cm) would be immature female cuckoo wrasse who have not had a chance to spawn. Individuals over 16 cm are likely to be mature females who have had the chance to spawn at least once. There is limited information surrounding the size range of sexual inversion. Darwall *et al*. (1992) reported sexual maturity of males at 24 cm. In this case, there would be the potential to remove a proportion of males from the population. The fishery would therefore likely remove immature females, mature females, and mature males. Like ballan wrasse, this would have implications for the timing of sexual inversion and the targeting of different sexes could lead to potential impacts on breeding and subsequent recruitment.

Rock cook wrasse

Rock cook wrasse are believed to be a gonochoristic species, with no evidence of sex change (Dipper, 1987). It is the least studied of the five above-mentioned wrasse species so details of its reproductive strategy are not well known. Eggs of the rock cook are sticky and benthic, like other wrasse species, except for goldsinny, and so it is believed the male may build a nest (Costello, 1991).

Potential implications of removing wrasse of a certain size (12-18 cm) can be inferred from life history parameter and existing literature. Like goldsinny wrasse, at the preferred size of removal, all individuals should have had the chance to reproduce before being caught and therefore all individuals being removed will be sexually mature. Like corkwing and goldsinny wrasse, males grow faster than females (Taki, 1974) and size selective harvesting of these individuals is likely to influence age structure and sex ratios (Sayer *et al*., 1996b; Varian *et al*., 1996; Halvorsen, 2016). The maximum removal size of 14cm will however ensure some large individuals both male and female are returned to the local population.

All species

There is the potential for sex-selective harvesting to take place in all above-mentioned five species. The sexual size dimorphism associated with all gonochoristic species, particularly corkwing, means the fishery will lead to the removal of larger males. The hermaphroditic nature of ballan and cuckoo wrasse, combined with greater sizes at sexual maturity, mean larger mature and smaller immature females are removed, with some concern over the removal of males in cuckoo wrasse. The greater size of sexual inversion for ballan wrasse however means this is less of a concern for this species. However, in the species Ballan, Corkwing, Rock cook and Goldsinny a maximum removal size of either 28, 22, or 18cm will ensure that a proportion of larger males and females of these species will be returned to the local populations there by reducing the likelihood of severe sex-selective harvesting.

Size selective harvesting has a variety of implication related to population dynamics, demography, and reproduction (Halvorsen, 2016). Firstly, it can truncate age and size distributions (Halvorsen, 2016). The depletion of older and larger individuals, particularly more fecund females, can influence recruitment and the ability to adapt to a changing environment (Longhurst, 2002; Hixon *et al*., 2014). In species with parental care (corkwing, cuckoo and ballan male wrasse), selective removal of those which exhibit this trait can directly influence the level of offspring survival (Suski *et al*., 2003; Sutter *et al*., 2012). Additionally, changes in sex ratio can also lead to sperm or egg limitation and impact on mating behaviour (i.e., reduction in encountering mates) and sexual selection (Rowe & Hutchings 2003; Alonzo & Mangel 2004; Kendall & Quinn 2013).

The varied life histories and reproductive strategies employed by all the different wrasse species mean that fishing is likely to affect each differently (Skiftesvik *et al*., 2014). There are however a few potential issues common to all species. The first is the demand for wrasse as cleaner fish coincides with their spawning season in spring and early summer (Costello, 1991). Skiftesvik *et al*. (2014) reported that fishing during the summer leads to a higher incidence of wounds and greater mortality, with female corkwing believed to be particularly vulnerable. The survival rate (75% mortality) of wrasse captured in June (i.e., during the spawning season) and subsequently kept in tanks was much lower than those captured in September (5% mortality). This led the authors to conclude that wrasse should be protected during the spawning season. As wrasse fishery guidance now recommends that fishing is not carried out between 1st April and 1st July, protecting much of the spawning season will be avoided giving more fish the opportunity to breed before the likelihood of capture.

The second issue relates to the territorial behaviour and prominent site fidelity exhibited by all above-mentioned five wrasse species (Costello, 1991; Skiftesvik *et al*., 2014). Villegas-Ríos *et al*. (2013b) reported a home range of 0.091±0.031 km^2 (91,000 m^2), with a core area of 0.019±0.006 km^2 for ballan wrasse. Other studies have reported territory sizes of 300 m^2 during the spawning period (Sjolander *et al*., 1972). Despite difference between studies, in relative terms this is still a small range and demonstrates the sedentary behaviour associated with this species (Villegas-Ríos *et al*., 2013b). Territory sizes for other species are smaller than that reported for ballan wrasse. Hillden (1981) reported an average territory size of 1.4 m^2 for goldsinny with no change in the size or form during the study period (May to September). The territory size for corkwing is around 10 m^2 (Sjolander *et al*., 1972), although individuals do travel up to 50 metres away from nesting sites (Potts, 1985).

A high site fidelity and small home ranges/ territories can lead to local depletion and limited potential for replenishment from nearby populations (Halvorsen, 2016). The size structure of the wrasse population will be an indicator of fishing intensity (Shepherd *et al*., 2010). If populations are genetically isolated from one another, there is likely to be a strong selection for slower growing and smaller individuals in populations within heavily fished areas (Skiftesvik *et al*., 2014). In addition to this, populations with poor genetic diversity are often associated with inbreeding, reduced fitness, and less evolutionary potential (Frankham, 2002; D'Arcy *et al*., 2013). Such implications may be true for corkwing wrasse and goldsinny wrasse as populations have been shown to be genetically differentiated along the cost of Norway (Sundt & Jorstad, 1998; Knutsen *et al*., 2013), but less so for cuckoo and ballan wrasse with studies revealing genetically differentiated populations on a much larger spatial scale between the Atlantic and Scandinavia (Robalo *et al*., 2011; D'Arcy *et al*., 2013).

This can be attributed to the relatively long planktonic larval stages observed in ballan and cuckoo wrasse which is likely to lower the level of genetic differentiation between neighbouring areas (D'Arcy *et al*., 2013).

Small MPAs (<0.5 km^2) can afford effective and long-term protection for species with high site fidelity and small home ranges/territories, like those exhibited by the above-mentioned five wrasse species (Morel *et al*., 2013). Halvorsen *et al*. (2017) explored the potential use of small MPAs (0.6-5.3 km^2), as no take-zones, as a management tool for the protection of targeted wrasse species (goldsinny and corkwing wrasse) in Norway. The study reported a greater prevalence of individuals above the minimum size limits for both species and concluded small MPAs have potential as a tool for maintaining natural population sizes and structure.

5.2.1.2 Wrasse populations elsewhere

In nearby Plymouth Sound, where four or five vessels remove up to 46,497 fish a year, evidence suggests that there has been a decline in ballan wrasse (Henley *et al.,* 2021). Similarly, in the Irish wrasse fishery, a decline in catch per unit effort (CPUE) for corkwing and goldsinny was reported in years following exploitation (Darwell et al., 1992; Deady et al., 1993; Varian et al., 1996). No formal study of Scottish stocks has been made but information suggests that declines occur on a regular basis and Scotland's wrasse stocks could not meet the demands of the Salmon farming industry which led to the English South Coast wrasse fishery (SIFT, 2019).

The study of wrasse stocks around the Norwegian coast suggests that stocks of corkwing and goldsinny wrasses have declined significantly (Halvorsen et al., 2017). The growth rate of male corkwing wrasse has been found to be positively affected by fishing activity, with the speed of growth increasing in fished areas. However, female corkwing and goldsinny growth rates were not affected (Berntsen, 2022). Contrastingly, in Sweden, wrasse stocks do not appear to have been impacted by the wrasse fishery (Bourlat et al., 2021).

5.2.1.3 Ecosystem-wide effects

Rocky reefs and their associated algal cover form at least one, if not the only habitat, of all above-mentioned five wrasse species (Costello, 1991). Although there are differences in the level of exposure and depths favoured by each species (Costello, 1991; Skiftesvik *et al*., 2015). Along the Norwegian coast, wrasse make up the most numerous fishes within shallow water communities (Halvorsen, 2016), although their importance in such a complex coastal ecosystem is unclear (Skiftesvik *et al*., 2014).

To identify the possible wider ecosystem effects that wrasse removal could have on this habitat type it is important to establish their role and position within the food web. Wrasse are considered to belong to a functional group known as 'coastal mesopredatory fish' (Bergström *et al*., 2016). Coastal mesopredatory fish are defined as mid-trophic level demersal and benthic species with a diet consisting predominantly of invertebrates (Bergström *et al*., 2016). Mesopredatory fish serve as a food source for higher trophic levels (i.e., piscivorous fish) and perform a regulating function on lower trophic levels (Sieben *et al*. 2011; Baden *et al*. 2012; Östman *et al*. 2016; Bergström *et al*., 2016). Thus, their abundance is highly likely to have important effects on other parts of the ecosystem web due to their central role within it (Bergström *et al*., 2016).

Wrasse graze algae and on animal growth found on seaweeds and rocks, and are important predators of hard-shelled animals, such as crustaceans and molluscs, leading to a diverse diet and making all species carnivorous (Bourlat et al., 2021; Costello, 1991; Sayer *et al*. 1995;1996a; Deady & Fives 1995). Dietary studies have revealed that decapods, predominantly *Cancer pagurus* and *Carcinus maenas*, represent a key food category for ballan wrasse (Dipper *et al*., 1977), whilst one of the main food categories for corkwing wrasse is gastropods molluscs; *Gibbula umbilicalis* and *Helcion pellucidum* in particular (Sayer *et al*., 1996a). The diet of rock cooks has been found to be dominated by bivalve molluscs and amphipods (Sayer *et al*., 1996a) and dominant food items for goldsinny, as well as larger corkwing, including mussels and barnacles (Deady & Fives, 1995; Sayer *et al*., 1995). The removal of wrasse, in their role as grazers and predators of epifaunal species, can lead to top-down effects (Bergström *et al*., 2016). Top-down effects include a loss of grazing control, whereby wrasse feed upon epifaunal species which in turn graze on algal species (Bergström *et al*., 2016). A loss of grazing control, caused by the removal of wrasse species, can therefore lead to an increase in epifaunal growth and subsequent increases in the grazing of algal species.

In coastal areas of temperate regions, an important example of the loss of grazing control is the overgrazing of algal assemblages (particularly kelp forests) by sea urchins, whose populations have increased as a result

of fisheries-related decline in predatory fish (Figueiredo *et al*. 2005). This concern has recently been cited by Coghlan *et al*. (2017) over the removal of wrasse for cleaner fish in salmon farms. Figueirdo *et al*. (2005) assessed the importance of sea urchins in the diets of ballan wrasses in the Azores and found that echinoderms, particularly echinoids, were the second most important prey group and accounted for 41.5% (by weight) of all identified food items and the importance of this prey group increased with fish size. Prior to this study, the importance of echinoderms in the diet of ballan wrasse had not been recorded. The study concluded that ballan wrasse are likely to provide a significant contribution to the control of sea urchin populations within the Azores and that a reduction in the mean size of fish (often a consequence of fishing) may lead to a significant decline in sea urchin predation and subsequent sea urchin proliferation and overgrazing. Another study, on the diet of corkwing wrasse on the west coast of Scotland, reported sea urchin spines in over 5% of individuals examined; much less than the reported for ballan wrasse in the Azores (Sayer *et al*., 1996a).

A few studies have examined the relationship between wrasse predation on epifaunal invertebrate grazers of algae found in rocky areas. Bourlat et al. (2021) investigated the effect of the presence of two Goldsinny wrasse in $1m^2$ tanks for 15 days. At the end of the experiment the total number of mesoherbivores was 40% less in tanks with wrasse and, the coverage of bryozoans on *S. latissima* hanging in the tanks was significantly lower in the control tanks. However, the total biomass of epibionts on the *Fucus serratus* algae on the bottom of the tank was not different between control and wrasse tanks.

In New Zealand, using mesocosm experiments, Perez-Matus and Shima (2010) investigated the interaction of two wrasse species, *Notolabrus celidotus* and *N. fucicola* and found both species had a positive indirect effect on the giant kelp, *Macrocystis pyrifera*, through the consumption and behavioural change of amphipods, respectively. Overall, the presence of the *N. celidotus* and *N. fucicola* led to a 5-fold and 2-fold decrease, respectively, in the number of grazing marks (Perez-Matus & Shima, 2010). Newcombe and Taylor (2010) conducted similar mesocosm experiments using *N. celidotus* and three species of brown macroalgae; *Ecklonia radiata*, *Carpophyllum flexuosum* and *C. maschalocarpum*. The study reported a reduction (to 7-20% of predator-free densities) in epifaunal grazing on algae species because of predation. When epifaunal densities were reduced (artificially or by fish predation), algal biomass was greater (due to less damage) but more heavily fouled. When predatory fish were not present, macroalgae sustained increased damage and biomass was reduced to 21-74% of epifauna-free algal biomass. In the study a trophic cascade was apparent, as the addition of predator led to a reversal in the decline of primary producer biomass caused by herbivores (Newcombe & Taylor, 2010). The results of the study were not found to be consistent with field surveys of varying fish densities.

The above studies demonstrate the potential importance of top-down control of epibenthic grazers and how the removal of wrasse might lead to potential trophic cascades. The applicability of these studies and their results however must be considered with caution, particularly with respect to study conducted by Figueirdo *et al*. (2005). This is due to the likely differences in epifaunal assemblages found in the Azores and found on the south coast of the UK, and thus the importance of echinoderms as a component of the species diet is likely to be less considerable.

Wrasse also serve as a prey species for gadoids, sea birds and mammals (seals and otters) (Steven 1933; Nedreas *et al*. 2008; Helfman *et al*., 2009; Smale, 2013). At low abundances of piscivores, the distribution of coastal mesopredatory fish and piscivores is tightly coupled (Bergström *et al*. 2016). A reduction in wrasse is therefore likely to lead to subsequent reduction and/or and change in the distribution of species which feed on them. Halvorsen (2016) reported goldsinny growth rates to be negatively related to population and the abundance of coastal cod. This demonstrates that the potential implications of wrasse removal are likely to be complex.

5.2.1.4 Cleaning behaviour

There is limited information surrounding the wild cleaning behaviour of ballan, corkwing, goldsinny, cuckoo and rock cook wrasse and field observations of the behaviour is rare (Costello, 1991). Several early observations were made of rock cooks cleaning behaviour of ballan wrasse and grey mullet (*Chelon labrosus*) in the wild (Potts, 1973; Costello, 1991). These was confirmed by later observations made by Henriques and

Almada (1997) at Arrabida, Portugal. Rock cook were observed to clean a total of 12 species, with corkwing and ballan wrasse being the most frequently cleaned (Henriques & Almada, 1997). From this study, it was reported that rock cook wrasse are facultative cleaner fish, with cleaning acts representing 7% of all feeding acts that were observed and an incidence rate of 11 per hour per host; similar to the number reported for tropical fish (12 acts per hour per host) (Grutter, 1995).

Similar early observations were made of wild goldsinny cleaning behaviour on the Swedish coast (Hillden, 1983), Lough Hyne, Ireland (Hutcherson, 1990) and Black Sea (Darkov & Mochek, 1980). The former two were involved the cleaning of ballan wrasse (Costello, 1991). Hillden (1983) showed goldsinny wrasse to be a facultative cleaner fish. A total of 24 cleaning acts were observed over a 6-year period (1975-1981) (Hillden, 1983).

Anecdotal observations of wild cleaning behaviour on the south-coast of the UK have also been made by Naylor (2005) who noted rock cook and goldsinny wrasse acting as cleaner fish on larger wrasse (i.e., Ballan wrasse), including the removal of parasites from their flanks, sometimes in small groups. Certain locations act as 'cleaning stations' where cleaning behaviour is regularly observed. Such locations include boilers on shallow-water wrecks, cleaning stations.

In aquaria, corkwing, goldsinny and rock cook were recorded to exhibit cleaning behaviour (Potts, 1973; Samuelsen, 1981). The species cleaned by wrasse varied and included plaice, black bream, red bream, mackerel, goldsinny wrasse, ballan wrasse and angler fish (Costello, 1991). The early observations of wrasse cleaning behaviour, made in the wild and aquaria stimulated interest in their use as cleaner fish in the salmon farming industry to control ectoparasites (Henriques & Almada, 1997). Introductory experiments in tanks and aquaria found that goldsinny, rock cook and female cuckoo wrasse acted as facultative cleaners of lice infested salmon (Bjordal, 1988; Bjourdal *et al*., 1991). Additional observations of cleaning behaviour of juvenile ballan wrasse and cuckoo wrasse were made by Potts (Bjourdal, 1991). The observations of cleaning behaviour obtained in fish farms and other captive conditions are likely to be poor predictors of behaviour of the same wrasse in nature and vice versa (Henriques & Almada, 1997).

Cleaning behaviour of fish is widely recognised as an integral part of maintaining overall reef health by removing parasites and cleaning damaged tissue from fish and other marine organisms (Natural England, 2017). The removal of significant numbers of wrasse could have adverse impacts of species that require cleaning, and subsequently the overall health of the reef (Natural England, 2017). The facultative cleaning behaviour of rock cock and goldsinny wrasse and limited observation of cleaning behaviour in the wild however implies the cleaning behaviour carried out by the different wrasse species is poorly understood within the ecosystem. Evidence from tropical ecosystems demonstrates the role of cleaning behaviour of certain wrasse species (summarised in section 6.2.2.2.4), but further investigation is necessary to better understand its role and importance within temperate ecosystems.

5.2.1.5 Evidence of cleaning behaviour in tropical ecosystems

In tropical systems, parasitic sea lice have been shown to have deleterious effects on coral reef fish (I.e., Finley & Forester, 2003; Grutter *et al*., 2011). Over a 5-month field study, Finley and Forester (2003) reported a significant reduction in growth (66%) and gonad mass (68%) and increase in mortality by a factor of 1.8 in the bridled goby, *Coryphopterus glaucofraenum*, because of a copepod microparasite infecting the gills. Parasitism was associated with an increase in gill ventilation rate and subsequent reductions in feeding. Similarly, Grutter *et al*. (2011) reported increased respiration (35% higher oxygen consumption rate) in resting juvenile damselfish (*Pomacentrus amboinensis*) parasitized with one gnathiid isopod, as well as reductions swimming speed, with parasitized individuals ceasing to swim before uninfected individuals in 77% of trials. When placed into their natural setting, parasitized individuals disappeared first in 67% of trials, thus potentially leading to an indirect effect on the successful establishment of juvenile fishes as they move from the pelagic environment to reefs.

The presence of cleaner fish in tropical reef systems has been shown to have a significant effect on the abundance parasitic sea lice (Grutter, 1996). Grutter (1996) examined the cleaning behaviour of blue streak cleaner wrasse (*Labroides dimidiatus*) on the Blackeye thick lip wrasse (*Hemigymnus melapterus*) infected with gnathiid isopods at Lizard Island, Great Barrier Reef. Based on predation rate and time spent inspecting

the host fish, it was estimated *L. dimidiatus* removed 61±5 per day; 6 times the number of gnathiids found per individual host fish (11±3). Such a high level of removal occurs due to the high infection rates of gnathiids, with gnathiid abundance shown to double in less than 6 days. As such, the high predation rate relative to the number of gnathiids on fish and their infection rate demonstrate *L. dimidiatus* have a significant effect on gnathiid abundance on infected host fish.

It may be expected, as shown from the deleterious effects sea lice can have on coral reef fish, the lack of cleaner fish may have negative implications on host fish populations. In a long-term study (over 8.5 years) conducted at Lizard Island, Waldie *et al*. (2011) reported a shift in size distribution to smaller damselfishes (Pomacentridae) in areas free of cleaner wrasse (*L. dimidiatus*). The same study also revealed implications on the overall coral reef fish community. Significant changes in community parameters were also observed, with a reduction in the abundance (37%) and richness (23%) of resident fishes in areas free of cleaner wrasse. Similar reductions in abundance (23%) and species richness (33%) of visitor fishes were also observed. Bshary (2003) reported similar findings, with significant declines in fish diversity 4 to 20 months after the removal of *L. dimidiatus* from patch reefs at Ras Mohammed National Park, Egypt. The immigration or experimental addition of cleaner wrasse led to a significant increase in fish diversity within 2 to 4 weeks, with increases most pronounced for visitor fishes. These studies demonstrate cleaner fish in tropical ecosystems can be of great ecological importance and are key for maintaining local reef diversity.

Further benefits of cleaner fish have been reported with respect to reductions in stress levels because of tactile stimulation from physical contact with cleaner fish (Bshary *et al*., 2007; Soares *et al*., 2011). Soares *et al*. (2011) reported significantly lower levels of cortisol in surgeonfish when stimulated by moving models, compared with control fish with access to stationary models. Bshary *et al*. (2007) reported similar findings in two client species (*Chromis dimidiata* and *Pseudanthias squamipinni*). Using cortisol levels as an indicator, a reduction in short term stress response to capture, transport and one-hour confinement in small aquaria occurred when in the presence of cleaner organisms (cleaner wrasse and shrimp). A reduction in stress response because of cleaner fish therefore indicates those with no access to cleaning organisms may be less fit.

5.2.2 Abrasion/disturbance of the substrate on the surface of the seabed (Physical)

It has been identified that potting for wrasse has the potential to cause an adverse impact on the features and sub-features of the Studland to Portland SAC through physical abrasion and its subsequent impact on the benthic environment and through the selective extraction of species. There are several factors that may influence the effect of potting of benthic habitats, including the spatial and temporal intensity of potting, technical gear type (single buoyed traps or strings of traps), the severity of weather and storm events, and the sensitivity of the effected benthic habitat (Young *et al*., 2013). Depth can also influence the effect of potting, with shallower depths potentially allowing for the greater movement of pots (Lewis *et al*., 2009).

Scientific research into the impacts of potting on reef habitats and associated communities has solely focused on those used to target on crab and lobster. Traps used to fish for wrasse are similar in nature to the pots used to crab and lobster and weigh the same, if not less. As such, results from these studies are directly relevantly and will be used in this assessment to determine the likely physical and biological disturbance caused by fish traps on the seabed (and associated communities).

Mechanical impacts of static gear include weights, anchors and pots hitting the seabed when the gear is set, hauled and the rubbing or entangling effects of ropes (when pots are fixed in strings) (JNCC & NE, 2011). In addition, the movement of gear may also occur over benthic habitats during rough weather or storm events (Stephenson *et al*. 2015).

Eno *et al*. (2001) reported that from observations of potting in Lyme Bay on rocky substrate, that when the wind and tidal streams were strong, pots tended to drag the most along the seabed, especially when the wind was blowing across the tide. Anchor-weights on the end of each string of pots are typically used to prevent dragging when fishing in dynamic areas (Coleman *et al*., 2013). When deployed correctly, pots were typically observed to be static, however when there is insufficient line during deployment, it can cause the lead pot to bounce up and down on the seabed during periods of strong tides and large swell (Eno *et al*., 2001).

Parlour pots take 3.46 s to settle on rocky reef seabed when set and are relatively stable once settled (no movement = in 86.36% of 25-minute soaks) (Gall *et al.,* 2020). 8% of pots showed occasional sporadic and small movements and only one pot made significant movements throughout the soak period. During the hauling process pots are in contact with the rocky reef seabed for 20.71s, in which time they interact with 3.04 m^2 of the seabed (Gall *et al.,* 2020). During Gall *et al.*'s study (2020) rope movements occurred in 51% of soaks, however only 46% of these were minimal movements in which no damage was caused.

Over longer-time scales significant pot movements are not reported to occur daily and occur on less than half of sampling days (6 out of 17) (Stephenson *et al*. 2015). Significant pot movements occur during neap and spring tides and at swell heights of 0-1 m and > 2 m, but not 1-2 m (Stephenson *et al*. 2015). As expected more significant movements are seen on spring tides. Mean and maximum pot movement distances increase with more extreme conditions, suggesting wave height and tidal height influence pot movement (Stephenson *et al*. 2015).

Pots impact an area between 53 and 115 m^2 per pot, with a mean of 85.8 m^2. Tide or swell height do not affect the size of the area impacted. The authors pointed out two aspects of the data that should be discussed, the first was lack of robustness based on the small number of significant pot movements and the second is the methodology which may underrepresent pot movement frequency. The conservative approach used to calculate 95% confidence intervals means only large movements will be significant as small non-significant distances are always lower than the mean error. Additionally, the mean error also means the range of possible movement is large and this means the potentially impacted area may be smaller.

5.2.3 Abrasion/disturbance of the substrate on the surface of the seabed (Biological)

Benthic communities, including epifauna and flora, may be directly impacted by potting gear in several ways, including being brought up in or attached to a pot, directly struck by a pot or end-weight during deployment, through the entanglement or removal with moving pots or ropes under the influence of tidal currents or waves and through retrieval of pots which may lead to lateral dragging of the gear as it is being lifted (Coleman *et al*., 2013, Ondes *et al.,* 2017). The latter method is generally avoided by fishers and is only likely to occur under the influence of wind, tide or navigational hazard which prevents vertical lift (Coleman *et al*., 2013). Up until recently there has been a paucity of scientific evidence on the impacts of static gear on benthic habitats (Walmsley *et al*., 2015). Although there is still considerably less scientific literature when compared to mobile fishing, there has been a recent rise in the number of studies investigating the impacts of potting to address this evidence gap. Some studies are ongoing and therefore only preliminary finding have been reported here.

Benthic Habitats and species

Walmsley *et al*. (2015) analysed existing literature and ongoing studies on the impacts of potting on different habitats and features as part of a project funded by the Department for Environment Food and Rural Affairs to provide conclusions from evidence on whether potting may compromise the achievement of conservation objectives within European Marine Sites. The review of evidence found limited sources of primary evidence specifically addressing the physical impact of potting. Studies reported no or limited significant impacts from potting on subtidal bedrock reef and subtidal boulder and cobble reef, on brittle star beds and subtidal mud. Evidence gaps were identified and include those which relate to certain habitats (specifically maerl, seagrass, mussel beds, subtidal mixed sediments) and pot types (I.e., whelk pots and cuttle traps). Overall, the review of evidence found that most sub-features are unlikely to be of significant concern, particularly at existing potting intensity levels and limited impacts are likely to be undetectable against natural variability and disturbance.

Since this paper, several more recent research papers have been published. Despite this there are still large gaps in evidence for many habitats.

Cover of reef individuals is significantly higher in areas which are only fished using pots vs areas fished with both pots and bottom towed gear (Figure 2. Gall *et al.,* 2020) . Similarly, but not significantly, counts of individuals, number of taxa and diversity is also higher in static gear only areas (Gall *et al.,* 2020). The assemblage composition of communities in areas fished using only static gear is significantly different to that in areas where both static gear and towed gears are present (Gall *et al.,* 2020). This is driven by higher abundance of hydroid and bryozoan turf, *Alcyonium digitatum* and *Alcyonidium diaphanum*.

Pot hauling removes between 25 and 30% of observed epibenthic species (Gall *et al.,* 2020). Of 18 identified taxa 14 can suffer damage from pot impacts, with six of these capable of being removed from the reef, including *Alcyonidium diaphanum, Alcyonium digitatum*, *Cliona celata, P. foliacea* and *D. grossularia* (Gall *et al.,* 2020). In four instances of rope movement, damage was limited to abrasion of *Alcyonium digitatum* and *E. verrucosa.* Only 3.7% of hauls resulted in ropes catching on fauna; *Alcyonium digitatum*, leading to abrasion and removal of 2 individuals (Gall *et al.,* 2020). In Gall *et al.'s* (2020) research at least one instance of the following species being removed from the reef was observed: *Alcyonium digitatum* and *Alcyonidium diaphanum, Cliona celata and Pentapora foliacea, Dendrodoa grossularia and macroalgae.* In the few instances where a pot landed directly on top of an individual, *Eunicella verrucosa* was observed to 'bounce back' once the pot had passed; supporting observations made by Eno *et al*. (2001).

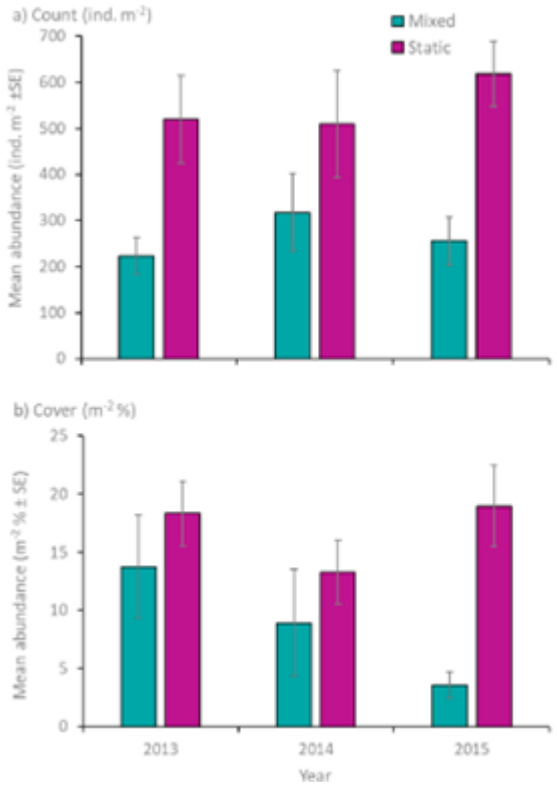


Figure 2 Mean abundance of a) Count (individuals m^2 +_ SE) and b) cover (m^2 +_ SE) individuals in static gear only and mixed gear (statis and towed) treatments per year 2013, 2014 and 2015. Taken from Gall et al., 2020.

Overall, significantly more individuals (all taxa) were not damaged compared to damaged and removed, as well as damaged compared to removed (Gall *et al.,* 2020). Pots do not damage all individuals of indicator taxa that fall in the total possible contact area, and instances of removal were uncommon (Gall *et al.,* 2020). However, for *C. celata, E. verrucosa, P. foliacea* and *Gymnangium montagui* (only one colony observed) more damaged individuals were observed than not damaged.

Although there was some level of damage and removal caused by potting impacts, the study suggested that the reef in Start Point to Plymouth Sound and Eddystone SCI was being maintained in a favourable condition, thus achieving the sites conservation objectives, despite the presence of potting activity.

Similarly, recent research in Lyme Bay looked at long-term effects (four years) of potting at different intensities on reef habitats, sessile reef species, mobile species, and target species (Rees *et al.,* 2021 & 2018). Over the four-year period sixteen areas were fished at varied levels of intensity (Control (no potting) = 0 pots, Low potting = 5-10 pots, Medium potting = 15-25 pots, High potting = 30+ pots. The work found that potting at low and medium intensities does not have significant negative impacts on benthic reef habitats (Figure 3)Figure 3. Most indicator species showed no significant effect of potting intensity including Pink Sea Fans (*E. verrucosa*) and Dead Man's Fingers (*A. digitatum*). In the high potting intensity sites total abundance of sessile reef species did decline but only two species were responsible for this result: The Ross Coral and Neptune's Heart sea squirt). The ross coral is particularly sensitive to potting and showed declines at all potting densities. Baited underwater videos revealed that potting density did not significantly affect mobile species with non-treatment specific interannual differences being found.

A study at the Lundy NTZ concluded no detectable effects of potting for lobster and crabs on the benthic assemblage over the four-year time scale of the experiment (Coleman *et al*. 2013). Differences in wave exposure, depth and substrate were present between control and NTZ locations. Control locations outside the NTZ were subject to normal levels of commercial fishing effort and those inside the NTZ were subject experimental potting of approximately 2000 pots per km^2 per year. Multivariate analyses revealed no difference in how assemblages changed over the four-year period between areas subject to potting and those not fished. It is important to note that physical differences in NTZ and control locations are likely to complicate the detection of any changes in assemblage.

Haynes *et al*. (2014) compared a dataset on the abundance of five sponge species (*Axinella dissimilis*, *Axinella infundibuliformis*, *Haliclona oculata*, *Stelligera stuposa* and *Raspailia ramosa*) from the Skomer Marine Nature Reserve collected during the autumn of 2006, 2008 and 2009, to pot density within a 50 m radius to assess the impacts of abrasion from potting. These species were identified as being susceptible to abrasion. Total species abundance and potting density (a proxy for abrasion) were tested and regression analysis revealed no significant relationship between sponge abundance and potting density. Regression analyses were also performed to examine potting density against sponge life strategy and morphotype diversity, as well as *Eucinella verrucosa* abundance (a potential indicator species for abrasion). The results reveal no significant relationship between any of these variables. Analysis of the data for testing and validation however proved inconclusive due to limited availability of suitable environmental and pressure data. The surveys were not designed to test to changes driven by a wide range of anthropogenic pressures and power to detect such changes was not a consideration of the original sampling design, meaning that existing datasets were not well suited for validation.

Stephenson *et al*. (2015; 2016) investigated the long-term impacts of potting on benthic habitats in the Berwickshire and North Northumberland Coast European Marine Site from 2002 to 2012.
Biotope analysis between 2002/03 and 2011 found that overall, the number and range of biotopes was maintained between the two sampling periods, with the persistence of a few dominating biotopes; infralittoral kelp and circalittoral faunal and algal crust biotopes. Non-significant differences in biotype richness between years and transects were a result of rare biotopes. Non-significant fluctuations in biotopes between years were attributed to natural variability and by the low frequency occurrence of rare biotopes. The methodology used did not allow for changes in abundance, species diversity or species composition of each biotope to be taken into account.

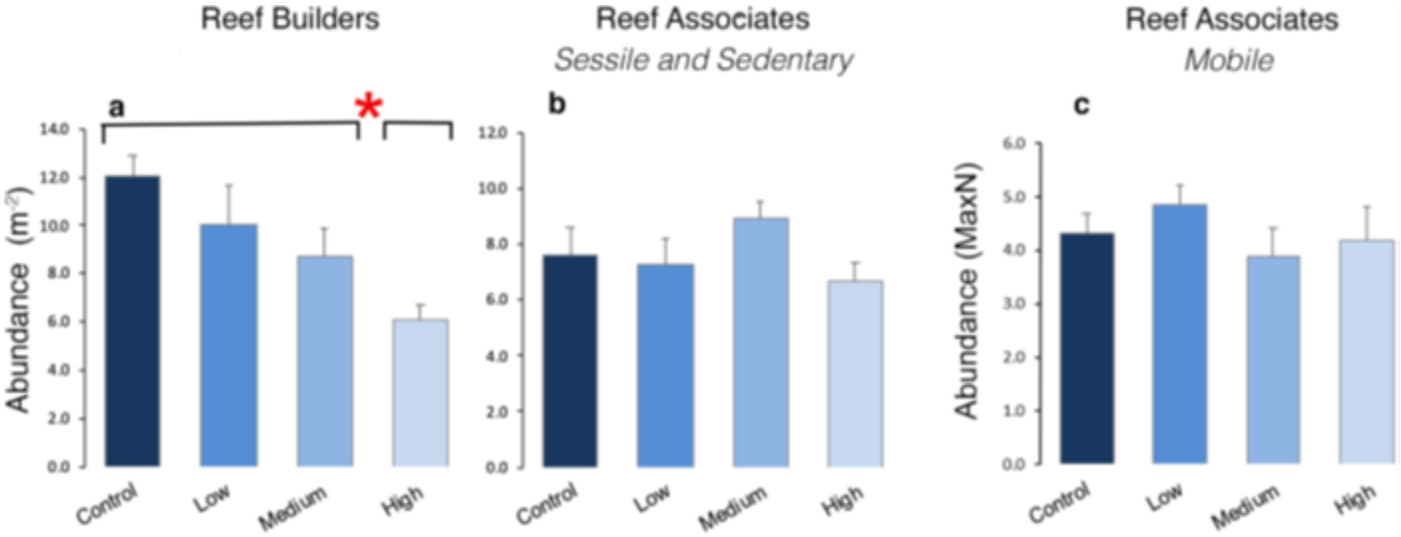


Figure 3 Mean abundance for each functional group by pot density treatment. Adapted from Rees et al., 2021.

When potting pressure data, and video monitoring footage was analysed to explore changes in benthic community structure within specific biotopes between years, the model indicated no significant changes in species composition of biotopes as a result of fishing pressure within the EMS between years. The only biotope to exhibit change in species composition between years was 'faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock' (CR.MCR.EcCR.FaAlCr), thus indicating minor change overall between 2002 and 2011. The author advised caution should be used during interpretation of results as temporal change is likely during this period, with further investigation recommended to determine specific links with pressures.

Only three biotopes showed significantly greater species richness at the low fishing pressure. However, non-significant greater species richness was reported at low fishing pressures in nine out of ten biotopes. Between years only one biotope showed significant differences in species richness; '*Laminaria hyperborea* on tide-swept infralittoral mixed substrata' (IR.MIR.KR.LhypT.Pk) where species richness decreased in 2011 when compared to 2003. The exception to this was 'Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock' (CR.MCR.EcCR.FaAlCr.Bri), where low species richness in

areas of low fishing pressure suggests that the assemblage structure may be affected (but was not found at high fishing pressure).

Further information however is required and conclusions were deemed as speculative. The results suggest that biotopes most likely to be impacted by fishing pressure are deeper, faunal and algal crusts as opposed to the shallower *Laminaria* biotopes. It does however remain uncertain as to whether fishing pressure is linked to species diversity as no clear pattern in species richness between years at different fishing pressure was observed. Analysis involving the reduced list of species, chosen in relation to those which can indicate biotope sensitivity to anthropogenic impacts, revealed no changes between years. Overall, it was concluded that, there was little evidence of change in species composition or species richness of biotopes between years and it was not fully possible to investigate the role of fishing pressure in relation to community change. Results from this research suggest that at the scale of the EMS, impacts of small-scale potting on epibenthic assemblages cannot be detected against the background of natural variability.
The third phase of the study aimed to quantify small scale potting impacts on two subtidal habitat types; 'Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock' (abbreviated as FaAlCr) and Laminaria hyperborea park with foliose red seaweeds on moderately exposed lower infralittoral rock (abbreviated as Lhyp.Pk) through in-situ experimental fishing using a BACI design (Stephenson *et al*., 2016; Stephenson *et al.,* 2017). Historic intensively (187-265 pots $month^{-1}$ km^{-2}) and lightly (0-139 pots $month^{-1}$ km^{-2}) fished areas were chosen and subject to the same level of experimental potting (equivalent to 10,000 pots $month^{-1}$ km^{-2}). Due to a lack of suitable sites Lhyp.Pk habitat was only sampled for intensively fished areas. Pots were left to soak, hauled, and then sampled three times in each site.

Overall changes in percentage benthos cover were the same between treatments (control and experimental fishing) in both habitats and fishing pressures. Whilst significant interactions between baseline and impact treatments were reported, assemblages between control baseline and control impact treatments also differed and no differences were observed between impact and control impact treatments, indicating temporal change in community composition cannot be attributed to potting impacts. Only minor differences were reported in overall abundance of individual species between treatments for the two habitat types. Percentage cover of species did not greatly differ between pre- and post-experimental fishing in impact or control areas, with no pattern in the benthos between treatments consistent with patterns predicted to occur from potting. FaAlCr habitats subject to intensive fishing activity exhibited a greater overall diversity and abundance of large erect species than areas of low fishing intensity showing that there are no evidence community composition differences between areas of different fishing intensity is caused by potting. The lack of short-term direct impacts shown by this study infer long-term direct impacts are unlikely in the habitats examined.

Similar short-term study has been completed in Lyme Bay and west Wales. Rocky substrate habitats and associated communities appeared to be unaffected (no significant differences in abundance of species) before and after four weeks of relatively intense fishing activity (equivalent to around 1,000,000 pot hauls per km^2 per year) (Eno *et al.,* 2001). In west Wales, the abundance of five sponge species (*Dysidea*, *Hemimycale*, *Phorbas*, *Tethya*, Axinellids) increased significantly in experimental plots after potting, whilst in control plots no significant changes were found, except for an increase in *Dysidea* spp. *Halichondria* spp. abundance which decreased significantly in control plots, but showed no significant change in experimental plots (Eno *et al.,* 2001). In Lyme Bay, three out of five species (*Phallusta*, *Stelligera/Raspailia*, *Pentapora*) significantly increased in abundance in experimental plots, whilst in control plots no significant changes were found in the same three species, in addition to *Haliclona simlans*. Significant changes in *Haliclona* spp. and *Eucinella* spp. abundance (within experimental plots) could not be determined as a result of statistical limitations (Eno *et al.,* 2001). *Pentapora foliacea* colony was found broken after hauling, although the cause of which is unknown and the Pink sea fan (*Eunicella verrucosa*) was observed to bend under the action of pots, but returned to an upright position once the pots had passed (Eno *et al.,* 2001).

5.3 Sensitivity

Table 4 shows the characterising biotopes[6] of the infralittoral rock sub-feature found in the Studland to Portland SAC. Where available the sensitivity of the biotope (as reported on MARLIN[7]) to the pressure likely to be exerted by pot fishing activities onto the biotopes has been recorded.

Table 4. The characterising biotopes found in the Studland to Portland SAC Infralittoral rock sub feature as described in Natural England's Conservation Advice.
[1] Considers the direct removal of the dominant algal species, [2] Considers the incidental removal through bycatch, [3] Also considers the removal of urchins, [4] Also considers the removal of top predators.

Biotope	**Sensitivity**		
	Abrasion	**Removal of target species[1]**	**Removal of non-target species[2]**
A3.116 - Foliose red seaweeds on exposed lower infralittoral rock	Low	Medium	Medium
A3.1161 - Foliose red seaweeds with dense *Dictyota dichotoma* and/or *Dictyopteris membranacea* on exposed lower infralittoral rock	Low	Medium[3]	Medium
A3.12 - Sediment-affected or disturbed kelp and seaweed communities	No Assessment		
A3.126 - *Halidrys siliquosa* and mixed kelps on tide-swept infralittoral rock with coarse sediment	Medium	Medium	Medium
A3.211 - *Laminaria digitata* on moderately exposed sublittoral fringe rock	Low	Medium	Medium[4]
A3.2122 - *Laminaria hyperborea* park with hydroids, bryozoans and sponges on tide-swept lower infralittoral rock	Medium	Medium	Medium

5.4 Site Condition

Natural England provides information on the condition of designated sites and describes the status of interest features. This is derived from the application of 'Common Standards Monitoring Guidance' which is applied to a subset of 'attributes' of site features as set out in the sites' Regulation 33/35 Conservation Advice document. Feature condition influences the Conservation Objectives in that it is used to determine whether a 'maintain' or 'recover' objective is needed to achieve the target level for each attribute. Natural England's previous process for conducting condition assessments for marine features was developed due to requirements to report on condition of Annex 1 features at the national level in 2012/13 under Article 17 of the Habitats Directive. Since then, the methods have been reviewed and Natural England are actively working to revise this process further so that it better fulfils obligations to inform management actions within MPAs and allows them to report on condition. The condition assessments for the features of European Marine Sites have now been made available for marine features. Studland to Portland SAC is in favourable condition, however the confidence of this assessment is low. This is because the assessment was mostly based on

[6] Taken from Natural England's' Supplementary Advice on Conservation Objectives.

[7] MarLIN - The Marine Life Information Network - Home

expert advice and activities data, rather than scientific data. Table 5 below summarises the condition of each sub-feature.

Table 5. A summary of the feature condition of the Studland to Portland SAC as per the Natural England Condition Assessment 2018.

Feature/ Sub-feature	Condition	Confidence
Reefs	Favourable	Low
Infralittoral Rock	Favourable	Low
Circalittoral Rock	Favourable	Low
Subtidal stony reef	Favourable	Low

5.5 Existing Management Measures

- **Vessels Used in Fishing Byelaw** – prohibits commercial fishing vessels over 12 metres from the Southern IFC District. The reduction in vessel size also restricts the type of gear that can be used and the level of static gear that can be worked.

- **Minimum Conservation Reference Size Byelaw** – prohibits the removal, storage, sale etc. of species below the specified size; Ballan wrasse (18cm), Corkwing wrasse (14cm), Rockcook wrasse (12cm), Goldsinny wrasse (12cm). Prohibitions cover all fishery participants and the onward supply chain.

- A **'Wrasse Fishery Guidance'** plan was introduced in June 2017 which involves a number of voluntary measures[8]. The plan includes:

    - Species-specific **maximum sizes**
        - Ballan wrasse: 28cm
        - Corkwing wrasse: 22cm
        - Rockcook wrasse: 18cm
        - Goldsinny wrasse: 18cm
        - Cuckoo wrasse: to be returned to the fishery immediately

    - **No take zones** and a no potting zone in many cases overlapping with the boundaries of Marine Protected Areas.
    - **Maximum fishing depth** – The placing of pots and rod and line fishing for wrasse should not take place in water deeper than 10 metres.
    - **Closed season** – The commercial fishing for live wrasse should not take place between the 1st April and the 30th June each year.
    - **Effort limitation** – Any fishing vessel using baited wrasse pots should use no more than 80 pots per vessel.
    - **Monthly vessel catch returns** detailing the quantities of species caught, fishing location and fishing effort.
    - **Biosecurity and husbandry** are related to the storing and transporting of live fish and seawater, following appropriate biosecurity and husbandry measures to prevent the mixing of genetic structure and transport of disease, parasites, and non-native species.

The Fishery Guidance aims to protect the long-term sustainability of wrasse populations within the Southern IFC District and maximise the enjoyment of the species by other users, notably recreational sea anglers, divers, and snorkelers.

The fishery guidance plan has been developed alongside the local fishers and with the scientific literature in mind. In line with byelaw making guidance, Southern IFCA encourages an 'industry-led' approach for the

[8] 2021-Wrasse-Fishery-Guidance-Final.pdf (toolkitfiles.co.uk)

management of the wrasse fishery in order to secure long-term sustainability. Southern IFCA have discussed the fishery guidance plan with local fishers and salmon farm representatives. Should the approach prove ineffective or significant changes occur within the fishery, Southern IFCA will consider what course of action is required in line with the feedback procedure outlined in the monitoring and control plan.

5.6 Monitoring and Control Plan

Under the 'Studland to Portland SAC Monitoring and Control Plan - Wrasse Fishing' (M&CP (Monitoring and Control Plan)) (Annex 2), a number of monitoring activities and variables accompany the seven-point 'Wrasse Fishery Guidance' plan. Each year, during and following completion of the wrasse fishing season, Southern IFCA carries out analysis of the fishery against the specified variables and their triggers. As described in the M&CP Assessment Feedback Process (Annex 2), if variables 1-5 or 8 are triggered, then the next step is to re-assess the HRA for the fishery. For a trigger of variable 6, the next stage is a review of management. The triggers are presented in 6. Southern IFCA has been monitoring these variables since 2018, with data from the fishery for that year acting as the baseline on which trigger levels were formed.

Table 6. Monitoring variables and triggers for assessment specified in the Southern IFCA Studland to Portland SAC Monitoring and Control Plan – Wrasse Fishery.

No.	Monitoring Variable	Trigger for Assessment
1	Industry demand – the number of wrasses required by the salmon farms	A 25% increase in the total number of wrasses landed in the fishery.
2	Landings Per Unit Effort (LPUE)	A significant seasonal reduction in LPUE between years. Caution must be taken to ensure the reduction in LPUE can be attributed to the fishery and not seasonal changes in population.
3	Fishing effort – number of vessels working	A 25% increase in the number of vessels fishing from the baseline.
4	Fishing Effort – number of pots/ rod hours fished	A significant increase in the total effort of the fishery from the baseline.
5	An introduction of a new fishing gear type	The introduction of a new gear type.
6	Non-compliance of Wrasse Fishery Guidance	Repeated non-compliance of the Wrasse Fishery Guidance on an individual vessel basis.
7	New evidence relating to impacts or mitigating factors	New evidence to demonstrate the activity is potentially having a significant effect on the features of the SAC, adverse or positive. New evidence to better inform the Wrasse Fishery Guidance i.e., size at which maturity occurs to inform maximum and minimum conservation reference sizes or spawning period of wrasse species to inform closed season
8	Condition of the SAC	Decline in the condition of the SAC and the likely cause of the decline attributed to the fishing activity.

MV1 – Industry Demand

Each season wrasse buyers submit their data on fish bought from within the District. The baseline figure from 2018 was 32,825 fish and therefore, the trigger is set at the removal of 41,031 fish. In 2019, the trigger level was reached (42,295 fish) in the final transport of the fishing season. In response, Southern IFCA engaged with buyers to explore methods of reducing catches to within the trigger level and outlining the implications for continuing to exceed the threshold. In 2020 and 2021 respectively, 34,299 and 36,331 fish were removed. In 2022, on 15th September the trigger for this monitoring variable was met (42,296 fish). The main buyer cancelled an order and reduced fishing effort once it was known that the trigger level would be met and the majority of fishing ceased following the trigger level being reached.

MV2 – Landing Per Unit Effort (LPUE)

To monitor Variable 2, the data collected in wrasse catch returns is used to calculate Landings Per Unit Effort (LPUE) for pot and rod fishing activities. The effect of the factors year, area fished and day of year (season) are studied to determine if they explain any variation in LPUE.

Year does not explain any difference in the total number of fish landed per pot. LPUE Total fish per pot has been found to be explained by the Area Fished.

For mixed wrasse (Corkwing, Goldsinny, Rockcook) LPUE per pot was initially explained by year, with LPUE decreasing each year from 2018 to 2020, but remained stable in 2021. The decrease in LPUE may be explained by a change in the target species which transitioned from all fish, to fish 14cm plus (mostly corkwing). When data from 2022 was included within the analysis, year no longer explained the difference, with Area Fished found to predict the LPUE best.

Between 2018 and 2021, differences in pot caught Ballan wrasse LPUE were explained by the variable year, with LPUE increasing in 2020 and 2021, compared to 2018 and 2019. However, when 2022 data was included in the analysis year was no longer predicted the differences, which were explained by the Area fished.

Similarly, LPUE of rod caught Ballan wrasse increased between 2018, 2019 and in 2021. No rod fishing occurred in 2020. When 2022 data was included in the analysis, year no longer explained the differences. As with other LPUEs (Landings Per Unit Effort) Area Fished explained the difference.

Separate data for corkwing LPUE per pot was collected in 2021 and 2022. Year and Area Fished were found to explain the differences with corkwing LPUE increasing in 2022.

The data analysis shows that of the three factors assessed fishing area has a significant and consistent impact on the LPUE of wrasse. The LPUE of corkwing and mixed wrasse (not including ballan) from pots are higher outside of the SAC in Balaclava Bay, Portland Harbour and Weymouth Bay. Compared to areas inside the SAC which are pot fished, these areas have a much larger area of shallow habitat which is the preferred habitat of these species. However, for rod caught ballan wrasse, LPUE is much higher within the SAC around the Isle of Portland, where the physical conditions (waves and tidal stream) are believed to better suite this species.

Year does not explain differences in LPUE which can be interpreted to suggest that fishing pressure is not currently having a successive impact on wrasse landings. However, these results should be interpreted with caution for many reasons. Only the fish removed by the fishery have been assessed and therefore, we do not have information on the total catch or lower and higher size classes. It is likely that other variables may influence wrasse LPUE such as; annual change in population size, seawater temperature, weather, fishing depth and method. Furthermore, the accuracy of the data is not known as it has been recorded by fishers in the field.

MV 3 – Number of vessels

The baseline for the number vessel participants was set at 9 in 2018. The trigger point is therefore 11 vessels. Nine or ten vessels have fished for wrasse each season. An additional vessel was requested in the 2022 season but the buyer chose not to engage this vessel in order to avoid triggering this variable.

MV 4 – Number of pots/rods

Since catch return forms have been collected it has not been possible to confidently assess any change in the number of pots hauled or the rod hours fished each season. Whilst the majority of catch returns are voluntarily submitted each season, a few inaccurate, incomplete, or missing catch return forms has meant that totals for this variable are not known.

MV 5 – Fishing gear

In 2018, the dominant fishery method changed from pots to the use of handlines and therefore the fishery was re-assessed because Monitoring Variable 5 was triggered. This assessment concluded that the new

fishing method was not likely to lead to an adverse effect on the SAC and therefore no change in management was required. Since then, no new fishing methods have been introduced and the fishery has fluctuated between being pot dominated or handline dominated dependent upon the requirements of wrasse buyers.

MV 6 - Compliance with fishery guidance measures

Inspections of wrasse landings at the quayside or during transport pick-ups has found particularly good compliance with the wrasse minimum (Statutory) and maximum (non-statutory) sizes and prohibition on landing of cuckoo wrasse. Compliance has been 100% in all years except in 2020 when one instance of non-compliance was found.

Compliance with the request to submit monthly catch return data improved over time (2018, 2019, 2020 and 2021), with 80%, 86%, 84% and 94% of the fish removed from the fishery recorded on catch return forms received by the Authority. In 2022, this reduced and catch returns were received for 84% of the fish removed during this fishing season.

MV 7 – New evidence

Southern IFCA has not become aware of any significant new evidence regarding the biology of wrasse species, the ecosystem impact of their removal or their stock status since 2018.

The University of Exeter research project (described in the monitoring and control plan), aims to investigate the functional role of wrasse within inshore reef systems and to learn more about the population structure of wrasses. Both these pieces of work have been started and are currently ongoing. Some results are likely to be ready early in 2023. Further work has also focused on the importance of wrasse for the angling sector and is currently in the publication stage.

In addition, CEFAS was undertaking a study of wrasse spawning however, no report has been published.

MV 8 – SAC condition

In 2018, the condition of the SAC was assessed as favourable. No new assessments have been completed.

5.7 Summary of Impacts

Table 7. The potential pressures, associated impacts, level of exposure and mitigation measures of wrasse pot and handline fishing are summarised. Only relevant pressures and attributes identified through the TLSE process have been considered here.

Feature and Sub feature(s)	Attribute	Target	Potential Pressure(s) and Associated Impacts	Nature and Likelihood of Impacts	Mitigation measures[9]
Reef - Infralittoral rock	Structure and function: presence and abundance of key structural and influential species AND Structure: species composition of component communities; AND Distribution: presence and spatial distribution of biological communities	Maintain the species composition of component communities AND Maintain the presence and spatial distribution of reef communities according to the map AND [Maintain OR Recover OR Restore] the abundance of listed species*, to enable each of them to be a viable	The removal of the target species has the potential to lead to a change in the species composition or distribution of key species or biological communities. The fishery targets wrasse species at prescribed sizes. Such removal impacts directly on wrasse populations through size-selective harvesting (Halvorsen, 2016). Studies have highlighted concerns surrounding the direct impacts of size-selective harvesting on wrasse populations, particularly the removal of larger more fecund sexually mature adults, as well as immature individuals, and the species dependant associated impacts on population structure and reproduction (Darwall *et al*., 1992; Deady *et al*. 1993; Varian *et al*., 1996; Muncaster *et al*., 2013; Leclercq *et al*., 2014; Halvorsen, 2016;	The measure of these attributes is the presence and/abundance of subtidal rock communities and key species. The SAC Conservation Advice does not describe and key species. Characterising red algae and kelp biotopes are described. Therefore, the main concerns surrounding this attribute are related to the potential indirect impacts of the removal of wrasse species as a mesopredator of algal grazers, where the reduced predation of the grazers could lead to over-grazed biotopes. The MarLIN web pages for the relevant biotopes highlights mechanisms that control sea urchin aggregations are poorly understood but have been attributed to strong wave action and top-down urchin predators (cod, lobsters, fish). Large-scale urchin barrens within the North East Atlantic are limited to the North Norwegian and Russian Coast. Within the UK, 'urchin barrens' are rare and not presently an issue within the UK. Some urchin grazed biotopes are found in the Portland area of the SAC. Such issues, with respect to urchin barrens, are not highlighted as an issue within the Studland to Portland SAC Conservation Advice. Literature from tropical reef systems highlights the deleterious effect sea lice can have on the health of coral reef fish species, the importance of cleaner fish with respect to the removal of sea lice and the potential ecological importance of cleaner fish and	**Vessel Used in Fishing byelaw** prohibits commercial fishing vessels over 12 metres from the Southern IFC District. The reduction in vessel size also restricts the numbers of traps that can be worked. **Minimum Conservation Reference Size Byelaw** - specifies minimum sizes below which wrasse must be returned to sea Ballan 18cm, Corkwing 14 cm, Goldsinny and Rockcook 12cm. Southern IFCA has provided **'Wrasse Fishery Guidance'** to the industry which has been supported by both the fishers as well as the wrasse buyers. The Guidance stipulates the following fishery procedures which are monitored by IFCO (Inshore Fisheries and Conservation Officer) officers when out on patrol or carrying out catch inspections: **Maximum conservation reference sizes**

[9] Detail how this reduces/removes the potential pressure/impact(s) on the feature e.g., spatial/temporal/effort restrictions that would be introduced.

		component of the habitat.	Halvorsen *et al*., 2016; 2017). Other concerns directly influencing wrasse populations include targeting wrasse during the spawning season (Skiftesvik *et al*., 2014) and potential for local depletion associated with their small home ranges/ territories and high site fidelity (Halvorsen, 2016). In the SAC's Conservation Advice, no key or influential species are described. Although, wrasse are mentioned under the general description 'Reefs' as a species group which is supported by the feature. There are a number of characterising biotopes described for infralittoral rock which have the potential to be indirectly impacted by the removal of wrasse. Principally the dominant algal species; *Laminaria hyperborea*, *Laminaria digitata and Halidrys siliquosa*. The removal of wrasse and any subsequent impacts on population structure and reproduction may have wider ranging ecosystem impacts. Wrasse are defined as mesopredatory fish whose diet consists primarily of invertebrates (Bergström *et al*., 2016). This functional	their role in maintaining local reef diversity. UK wrasse species have been observed to remove parasites from other fish in in aquaria and reef systems. However, they are believed to be facultative cleaners and the scale of their importance is not well understood. In 2022, 10 licenced vessels fished for wrasse between July and early November and removed 42,296 wrasses. Of these vessels 2 used handlines as their dominant fishing method targeting ballan wrasse. The remaining vessels used pots as their dominant fishing method, but also carried out some handline fishing at the beginning of the season. Buyer 2 chose to halt handline activity when they became aware that the M&CP Variable 1 was likely to be triggered. Wrasse fishery guidance does not permit wrasse fishing in the Closed Period from 1st April to 30th June each year to protect wrasse spawning seasons and weather prevents fishing from November to April thereby providing wrasse eight months a year in which they are not commercially targeted. The majority of fishing occurs outside the SAC in and around Portland Harbour and Weymouth Bay. In additions, fishing for wrasse is limited to approximately 10 metres or less in depth in order to ensure fish are retained alive in good condition. In addition, no take zones and no pot zones reduce the area over which fishing occurs and therefore, approximately only, 9.9 % of infralittoral rock habitat is targeted. The remaining areas are likely to act as refuge areas and a source of replenishment for fished areas. Four wrasse species are known to be common in the SAC. Originally Ballan wrasse were the main target species, then a shift was seen in which the other wrasse species (Corkwing, Goldsinny and Rockcook) were increasingly targeted. Now, the	Ballan 28cm, Corkwing 22cm, Rockcook 18cm, Goldsinny 18 cm, Cuckoo wrasse: to be returned to the fishery immediately **No take zones** – six no take zones are described as well as a 'no potting' zone between Portland Bill and Chesil Cove. **Closed Season** – 1st April to 30th June each year **Maximum fishing depth –** fishing for wrasse should not take place in water deeper than 10 meters. **Pot Effort Limitation** – no more than 80 baited wrasse pots per vessel **Catch data** – All fist sale buyers of wrasse must submit sales notes. Fishers are requested to submit monthly catch return forms detailing quantity and species caught, fishing location and effort **Biosecurity and husbandry –** appropriate measures should be followed **Wrasse Fishery Monitoring and Control Plan –** Under this document a number of variables are set to monitor any change in the fishery. In 2022 Industry demand increased by 25% from the 2018 baseline. This triggered the need for this assessment. The number of participating vessels

			group serve as a food resource for higher trophic levels and perform a regulatory function on lower trophic levels, including a top-down control on epifauna which graze upon algal species (Bergström *et al*., 2016). The removal of wrasse, as an epibenthic grazer, may therefore, have indirect effects on algal biomass through the loss top-down control on epifaunal growth and subsequent overgrazing (Bergström *et al*., 2016). A number of studies based in New Zealand reported a positive indirect effect of wrasse species on macroalgae, with significant increases in biomass in the presence of fish predators (Perez-Matus & Shima, 2010; Newcombe & Taylor, 2010). The MarLIN[8] habitat sensitivity assessments highlight that red seaweed and kelp biotopes are partially reliant on low or no populations of sea urchins, with dense aggregations a key threat to these biotopes in the North Atlantic. Intense urchin grazing can lead to a shift from kelp dominated biotopes to urchin barrens, with subsequent reductions in	fishery mostly targets only two species – ballan and corkwing wrasse due to the price structure and size preference of wrasse at 14cm and above. Therefore, the majority of Goldsinny and Rockcook wrasse are returned if caught, and many undersized ballan and corkwing wrasse are also returned. Compliance with the maximum sizes is good and therefore, many large wrasses are also returned to the fishery as well. It is unknown if the functional role of each species is interchangeable, however all wrasse species are considered to belong to the functional group 'coastal mesopredatory fish' and to some extent are likely to perform similar roles as mid-trophic level demersal predators of benthic species consisting predominantly of invertebrates, and facultative cleaner fish. Analysis of LPUE data does not suggest that the fishing activity is having a negative impact on the landings of total wrasse, mixed, ballan or corkwing wrasse. LPUE does vary significantly between different areas fished with Ringsted Bay showing lower CPUE, whilst Balaclava Bay, Portland Harbour and Weymouth Bay showing higher LPUE. This is despite the industry demand trigger being reached in 2019 with analysis continuing for a further two years since. Therefore, when the scale, effort and location of the wrasse fishery is considered, with the Wrasse Fishery Guidance measures and the Monitoring and Control Plan, as well as the fact that wrasse are not designated or described as key or influential to the site features it is it is concluded that removal of target species from wrasse fishing will not lead to a significant impact on the infralittoral reef feature.	has remained the same and the gears fished remains to be dominantly pots with some handline activity. In 2022 compliance inspections found 100% compliance with the minimum and maximum conservation reference sizes. No new evidence regarding wrasse biology, the impacts of the fishery, or conditions of the SAC have become available. Unfortunately, it has not been possible to monitor the number of pots/rods used each season due to data limitations. Five years of Landings Per Unit Effort data analysis does not currently suggest that Landings are declining. The monitoring of the fishery will continue each year.

			biodiversity. Urchin populations are controlled by moderate to strong wave action as well as predators including lobsters, crabs, and fish. The cleaning behaviour of wrasse has been observed at low levels in the wild, but is poorly understood and is likely to be exaggerated within the studied artificial aquaria settings (Henriques & Almada, 1997). However, parasitic lice are known to have deleterious effects on coral reef fish (Finley & Forester, 2003), with the presences of cleaner fish shown to significantly reduce lice abundance (Grutter, 1996).		
Reef - Infralittoral rock	Structure and function: presence and abundance of key structural and influential species AND Structure: species composition of component communities; AND	Maintain the species composition of component communities AND Maintain the presence and spatial distribution of reef communities according to the map	Abrasion/disturbance of the substrate on the surface of the seabed and removal of target species were identified as potential pressures. Benthic communities can be directly impacted by potting through crushing, entanglement, or removal when gear is being deployed, hauled or through the influence of currents or waves which can lead to lateral damage. Erect and branching species are often characterised by slow growth and therefore considered particularly	10 commercially licenced vessels, all less than 8 meters in length, have historically fished for wrasse using traps. In 2022, only 6 vessels used traps, with only one of these fishing inside the SAC. Under the wrasse fishery guidance measures vessels are restricted to 80 pots. Only 60 traps are reported on catch return data as used in the SAC. These are fished between White Nothe to Lulworth area. No wrasse pot fishing occurs in the Portland area of the SAC. Fishing for wrasse is limited to depths of approximately 10m or less in order to retain live fish which are in good condition, and therefore fishing is not carried out over the majority of the site which reaches significantly deeper depths.	

	Distribution: presence and spatial distribution of biological communities	AND [Maintain OR Recover OR Restore] the abundance of listed species*, to enable each of them to be a viable component of the habitat.	vulnerable to physical damage. Existing literature, the majority of which has been recently published, infers that potting impacts on temperate rocky habitats are negligible or limited in extent. Pots interact with relatively small areas of the benthos (Gall et al., 2020) and rarely show significant movements once set, if set correctly (Stephenson et al., 2015). Potting activity is less damaging than towed gears (Gall et al., 2020). Fauna and flora can be damaged and removed by potting activity, with erect and branching species particularly vulnerable (Gall et al., 2020). However overall, significantly more individuals are not damaged compared to damaged or removed, highlighting that pots do not damage and remove all individuals in the contact area and instances of removal are uncommon (Gall et al., 2020). Long term, potting at low and medium intensities does not have significant impacts on rocky reef benthic species (Rees et al., 2021 & 2018). At high intensities (120+ pots per km^2) only two of the species studied were affected	Existing scientific literature suggests that the impacts of low and medium intensity potting is negligible or has only limited impacts on benthic communities. Damage to benthic habitats by adverse weather conditions have been reported to be far in excess of that caused by potting activity (Rees et al., 2016). For the biotopes known to occur in infralittoral rock feature, MarLIN reports they have low or medium sensitivity to abrasion disturbance. One of the biotopes categorised with medium sensitivity is also characterised by natural abrasion from sediment scour. Both of the medium sensitivity biotopes have been based upon the impacts of bottom towed fishing gear rather than static gear. Thus, it is likely that these habitats also have a low sensitivity to abrasion from pot fishing. So, due to the very low level of wrasse potting activity occurring in the SAC, the low sensitivity of the biotopes of the feature, and the knowledge that at low intensity levels potting does not lead to significant impacts on benthic habitats, it is concluded that abrasion/disturbance of the surface of the seabed caused by wrasse pot fishing will not lead to a significant impact on the infralittoral reef feature.	

			significantly, ross coral and Neptune's heart sea squirt. Other potting studies have found no effect of potting intensity on rocky reef communities (Coleman et al., 2013; Hayes et al., 2014; Stephenson et al., 2015 & 2016; Eno et al., 2001).		

6 Conclusion[10]

In order to conclude whether fishing for wrasse using Pots/traps and Handlines is likely to have an adverse effect on the integrity of the Studland to Portland SAC, it was necessary to assess whether the impacts of the activity are likely to hinder the site's conservation objectives, namely:

"Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats
- The structure and function (including typical species) of qualifying natural habitats, and
- The supporting processes on which the qualifying natural habitats rely."

A review of research and scientific literature focused on the potential impacts of pressures identified through the test of likely significant effect (TLSE) process (removal of target species and, abrasion/disturbance on the surface of the seabed from pot fishing). These potential impacts were then assessed against relevant attributes (Structure: species composition of component communities, Structure and function: presence and abundance of key structural and influential species, Distribution: presence and spatial distribution of biological communities), also identified through the TLSE process.

With regards to abrasion/disturbance…of the seabed, research into the impacts of potting on temperate rocky habitats has shown that, at low intensity levels, the impacts are negligible or limited in extent (Rees et al., 2018). These impacts are especially low when compared to the impacts resulting from periods of adverse weather (Young *et al*., 2013; Rees et al., 2016). Elsewhere, Gall (2016) concluded the reef in Start Point to Plymouth Sound and Eddystone SCI is being maintained in favourable condition, thus achieving the sites conservation objectives, despite the presence of potting activity. Only one fishing vessel uses a maximum of 80 pots within the SAC, for just four months each year, in a small area of the site. Therefore, it was concluded that the wrasse fishery will not be having a significant effect on the site through the pressure abrasion/disturbance…of the seabed.

With regards to the removal of target species, the reproductive strategies and life history of the four targeted wrasse species, combined with studies on past or current wrasse fisheries were used to determine the likely direct impacts on wrasse populations. Research highlighted that the wrasse fishery was size-selective and could therefore lead to the removal of certain groups from the population. Prior to the introduction of the wrasse fishery guidance the removal of ballan wrasse at the preferred size could lead to the removal of immature and larger mature females. For the smaller gonochoristic species (corkwing, goldsinny and rock cook), mature individuals, particularly males were particularly vulnerable. This could have a variety of implications related to population dynamics, demography and reproduction (Halvorsen, 2016).

Following the introduction of the minimum and maximum sizes, the former as a regulation under the Southern IFCA MCRS byelaw and the latter as part of the wrasse fishery guidance, the impacts through size selective harvesting will be reduced as much as possible. The measures will allow individuals to reproduce at least once before being removed from the fishery and will protect species with complex reproductive strategies. Furthermore, when considering the direct impacts on wrasse populations in the context of the relevant attributes identified, whilst mentioned under the general description of the 'Reef' feature in the site's Conservation Advice, wrasse species are not a designated feature of the site, nor are they described as key influential or structural, or key to particular biotopes. Therefore, the direct impacts on wrasse populations, are not directly relevant in the context of this assessment and the attributes against which these impacts are assessed.

The indirect impacts arising from the removal of wrasse and any subsequent changes in population and reproduction were also considered. There is a lack of evidence surrounding the ecological function of wrasse

[10] If conclusion of adverse effect alone an in-combination assessment is not required.

species and subsequent wider ecosystem impacts resulting from their removal. As such, best available evidence, on the diet of wrasse species and the ecosystem/trophic interactions studied in other temperate reef habitats, was used to infer the potential for ecosystem impacts. Specifically, research highlighted the positive role of wrasse as an epibenthic grazer, controlling grazing invertebrates which in turn allows algal biomass to increase or remain stable (Bergström *et al*., 2016; Perez-Matus & Shima, 2010; Newcombe & Taylor, 2010). Changes in this functioning has the potential to affect a number of the characterising biotopes found in the site which are dominated by red seaweed and kelp species.

The characteristics of the fishery and measures restricting it under the Wrasse Fishery Guidance mitigate against this impact. Due to a closed season and weather restrictions fishing occurs for only four months of the year (July to early November). In addition, due to a network of closed areas and a no potting area, combined with a limited fishing depth, the fishery only occurs in a small area of the SAC equating to just 9.9% of the infralittoral rock feature. Furthermore, as reported in Catch Return Forms, the majority of the fishery occurs outside of the SAC between Ringsted Bay and Balaclava Bay thereby exerting minor impact on the site itself. Together, this leaves a significant portion of the site and targeted habitat to act as refuge areas for wrasse populations ensuring that fished areas do not become depleted of wrasse.

Currently, the dominant species targeted are ballan wrasse and corkwing wrasse with the majority of goldsinny and rock cook wrasse being returned and minimum and maximum sizes also ensuring a proportion of ballan, and corkwing wrasse remain in the fished population. As all wrasses are considered to belong to the 'coastal meso-predatory fish' functional group and thus to some extent perform similar functional roles, the wrasses returned, and those which remain from unfished areas are likely to continue to exert their top-down control on epifaunal growth and grazing.

The fishery is underpinned by a Monitoring and Control plan. Monitoring of the fishery has found almost 100 percent compliance with the Wrasse fishery minimum and maximum sizes, which are also self-regulated by the industry itself so wrasse successfully perform their role. Annual analysis of five years of Landings Per Unit Effort data does not suggest that landings of wrasses are declining, despite the fishery having removed the trigger level of wrasses in 2019. At the time of writing this assessment no new evidence was available on status of wrasse stocks, their biology, or the indirect impacts of their removal.

It is Southern IFCAs (Inshore Fisheries and Conservation Authority) duty as the competent and relevant authority to manage damaging activities that may affect site integrity and lead to deterioration of the site. Whilst the wrasse fishery demand reached the trigger level in 2022, the wrasse fishery continues to be controlled and monitored through one of the largest combinations of measures of any fishery in the Southern IFCA including regulatory measures in the form of MCRS. This prevents fishing mortality in large parts of the SAC through spatial restrictions, and limits fishing mortality in those areas which are fished, through voluntary and statutory measures such as, restrictions on size of removal, effort limitation and temporal restrictions. Furthermore, the majority of the wrasses removed by the fishery are taken from outside of the site.

Therefore, when the effort, scale, location and status of monitoring and control of the activity is considered, it is concluded that the wrasse fishery as it is currently managed does not have the potential to lead to an adverse effect on the Studland to Portland SAC's site integrity.

Southern IFCA is aware that the evidence used to inform this assessment, whilst currently the best available, does not have high confidence levels. Some aspects of the Wrasse Fishery Guidance may not be being fully adhered to by all fishers (catch return forms and pot limit), however further evidence is required to support whether this is the case, for pot limits in particular, and officers have already been working with stakeholders to try and address any issues. Southern IFCA also recognises concerns raised by some stakeholders regarding the impact of the fishery and that further evidence on the fishery and its relationship to the marine environment is likely to be forthcoming in 2023, for example through the results of a PhD project studying wrasse biology and fisheries which is currently underway, with results anticipated in 2023. Therefore, Southern IFCA intend to explore the most appropriate way to move forward with management of this fishery in line with the outcome of this Assessment. This includes continuing to monitor the fishery as described in the Monitoring and Control Plan, including keeping up to date with any new external evidence which becomes

available which may help inform future management of the fishery and associated monitoring. In addition, Southern IFCA will consider further evidence gathering opportunities where possible to inform the monitoring of this fishery and look to collate such information to inform the management of the fishery which may include future assessments of the appropriateness of the monitoring variables and trigger levels (which were set in 2017) to ensure that appropriate data can be collected to inform the sustainable management of the fishery.

7 In-combination assessment

It was concluded that no adverse effect on the reef feature/sub-features of Studland to Portland SAC was anticipated for wrasse fishing alone, within the SAC. There is the potential for wrasse fishing activity to have a likely significant effect when considered in-combination with other fishing activities that occur within the site. Any fishing activities that were screened out as part of the revised approach assessment process will not be considered (see Studland to Portland SAC screening summary for details of these activities). Furthermore, any fishing activities which do not lead to the same pressures (removal of target species (wrasses) and abrasion/disturbance of the seabed) are not considered for in combination effects.

Other than fishing activities, no other plans and projects were found to occur within or to potentially affect the Studland to Portland SAC.

Other fishing activities

Table 8. The in-combination assessment of wrasse fishing with other fishing activities known to occur within the Studland to Portland SAC. Only fishing activities which exert the same pressures as wrasse fishing (removal of target species and abrasion/disturbance … of the seabed) are included.

Fishing activity	Potential for in-combination effect
Recreational Angling	Recreational anglers' fish along the shore of the Studland to Portland SAC and therefore may exert the pressure removal of target species which could combine with the commercial fishery. However, wrasse are not usually a target species but, are caught by anglers as incidental catch. The intensity of the activity is not well understood as there is no established form of evidence gathering on either effort or the impact of angling fisheries across the whole of the UK. Anglers do not retain wrasses for consumption, with the majority of anglers operating on a catch and release basis for all fish species. Therefore, wrasse caught by anglers will be returned to the sea. The wrasse caught from the shore are hauled from very shallow depths and consequently, the likelihood of barotrauma effects is low. Unfortunately, there is no available evidence on the survivability of wrasse species after catch and release. Based upon other species, survivability is likely to be varied depending on an anglers' skills, gear set and handling efficiency. The commercial and angling fisheries will overlap in limited areas around Portland Bill, and in the west from Ringstead Bay to Broadbench. The commercial fishery directly removes a proportion of fish from the population but the angling fishery does not. The majority of commercial fishing occurs outside of the SAC and is governed by a wide range of measures to ensure it harvests wrasse at a sustainable level. Current evidence suggests that wrasse populations are remaining stable within the area. Therefore, based upon the available evidence, Southern IFCA concludes that angling (in which wrasse may be caught and released) and commercial wrasse fishing (governed by many management measures) are not likely to be leading to an in-combination effect on wrasse populations or the indirect effects of their removal.
Potting (crab & lobster)	Crab and lobster potting has the potential to exert the pressure abrasion/disturbance…of the seabed and removal of target species. Wrasse fishing effort both inside and outside the SAC in low (10 vessels) with the majority of the activity occurring outside the site and

	therefore not overlapping with crab and lobster fishing activity. Crab and lobster potting is carried out by approximately 18 vessels, many of which switch between crustacean fishing and wrasse fishing depending on the season. Whilst the location of crab and lobster potting and wrasse potting may overlap as the target habitat is rocky reef, crab and lobster potting is typically concentrated over areas of circalittoral rock whilst wrasse potting is focused on the infralittoral. Furthermore, wrasse fishing occurs mostly outside of the SAC and therefore only has a small direct impact on the designated site. Both activities have the potential to lead to physical abrasion/disturbance…on the seabed. Other potting activities are understood to occur in the site a low intensity levels of approximately 28 pots per km^2. Existing scientific literature suggests that the impact of potting on benthic communities is negligible or limited in extent particularly when occurring at low intensity levels. As such, the potential for any in-combination effects within the site through physical abrasion is extremely limited. The activities target different species in different areas of rocky reef (as described above) and therefore there are not likely to be any in-combination effects with respect to the removal of target species. However, wrasse are a low-level bycatch species in crab and lobster pots and, when occasionally caught may be retained for use as pot bait. Crab and lobster pots are set deeper than 10 metres in depth, so the wrasse unavoidably caught are likely to suffer the effects of barotrauma. These few individuals (typically one or two wrasses during a fishing trip) would be unlikely to survive if returned to the sea. Therefore, these individuals would be removed from the population whether or not they are retained by the vessels. The use of wrasse as bait for crab and lobster pot fisheries has been a longstanding practice occurring for generations. The non-target nature and very low level of removal of wrasse through crab/lobster pot fishing is not known to be a concern to the SAC. It is not believed that this practice is occurring at a level significant enough to lead to in-combination effect with the live wrasse fishery due to, the negligible impact of the gear, relatively low fishing effort, limited spatial overlap and separate target species.

8 Integrity test

It can be concluded that the activities in this Habitat Regulations Assessment (wrasse fishery), alone (at current levels) or in-combination with other activities, do not adversely affect the reef feature/sub-features of the Studland to Portland SAC.

As outlined in section 5.5 and 5.6, Southern IFCA has introduced a range of management measures in the form of the Wrasse Fishery Guidance and a Monitoring and Control Plan for the SAC's wrasse fishery in order to ensure its long-term sustainability. These measures prevent and reduce the fishing mortality, as well as provide a feedback process to ensure any changes to the fishery are considered.

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Annex 2. Studland to Portland SAC – Monitoring & Control Plan – Wrasse Fishing

Document Control

Title	**Studland to Portland SAC – Monitoring & Control Plan – Wrasse Fishing**
SIFCA Reference	MCP/02/001
Author	V Gravestock & C Smith
Approver	S Pengelly
Owner	Southern IFCA
Template Used	MCP Assessment Template v1.0

Revision History

Date	Author	Version	Status	Reason	Approver(s)
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21/05/2018	S Pengelly	1.1	Draft	Internal review	
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25/01/2021	C Smith	1.7	Draft	Updates to 'Triggers'	
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This document has been distributed for information and comment to:

Title	Name	Date sent	Comments received
Natural England	Alex Maydew	03/06/2019	

Southern Inshore Fisheries and Conservation Authority (IFCA)

Monitoring and Control Plan

Site: Studland to Portland SAC

Feature(s): Reef

Sub-Feature(s): Circalittoral rock, Infralittoral rock, Subtidal stony reef

Gear types(s): Wrasse fishing – fish traps and handlines

1.0 Introduction

Inshore Fisheries and Conservation Authorities (IFCAs) have a legal responsibility to ensure fishing activities taking place in Marine Protected Area(s) do not damage, disturb or lead to the deterioration of the habitats and species for which the site has been designated and thus ensure the conservation objectives of the site can be achieved. These responsibilities fall under the Conservation of Habitats and Species Regulations 2017 to ensure compliance with the European Habitats and Birds Directives (with respect to European Marine Sites) and the Marine and Coastal Access Act 2009 (with respect to Marine Conservation Zones).

In 2012, the Department for Environment, Food and Rural Affairs (Defra) announced a revised approach to the management of commercial fisheries in European Marine Sites (EMSs), with the objective of ensuring all existing and potential commercial fishing activities are managed in accordance with the Habitats Directive. This led to a risk-prioritised and phased assessment process, whereby the features of all sites were assessed against all fishing activities taking place within a site, in order to identify if these activities were compatible with the conservation objectives of the site and if the need for management was required. All interactions between commercial fishing activities and designated site features in the Southern IFCA district have been assessed and any necessary management has been introduced. A similar assessment process has been undertaken for Marine Conservation Zones (MCZs).

Fishing is a dynamic and ever-changing industry with potential changes in fishing effort, introduction of new or improvement of existing gear types or the development of new commercial fisheries. Such changes may have the potential to cause damage or lead to the deterioration of protected habitats and species if they occur within an MPA. A process to detect and assess such changes or any new evidence and determine the need for management is therefore imperative to ensure fishing activities remain compatible with the conservation objectives of MPAs. For such as process to be effective, a clear and defined feedback process must be established as part of the assessment process. The elements which make up the feedback process will be outlined in this Monitoring and Control Plan and this will provide a framework for adaptive management.

This Monitoring and Control Plan will sit alongside the relevant Habitat Regulation Assessment(s) and should be read in conjunction with those assessments.

2.0 Site Information

- Studland to Portland Special Area of Conservation (SAC) (UK0030382)

2.1 Overview and qualifying features

Studland to Portland SAC is located off the south coast of England in the county of Dorset. The site covers 33,191 hectares of marine habitats and is made up of two separate areas; the Studland Bay to Ringstead Bay reefs and the Portland reefs. These areas contain a diverse array of underwater reef habitats which distinguish the site as one of conservation importance. The qualifying features of the site so named and protected by the designation are:

Feature: Reefs.

- **Sub-features:**
  - Circalittoral rock
  - Infralittoral rock
  - Subtidal stony reef

2.2 Conservation Objectives

The site's conservation objectives apply to the site and the individual species and/or assemblage of species for which the site has been classified (Qualifying features: Reefs).

The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of the qualifying species.
- The structure and function (including typical species) of qualifying natural habitats.
- The structure and function of the habitats of the qualifying species.
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely.
- The populations of qualifying species.
- The distribution of qualifying species within the site.

2.3 Site Feature Map

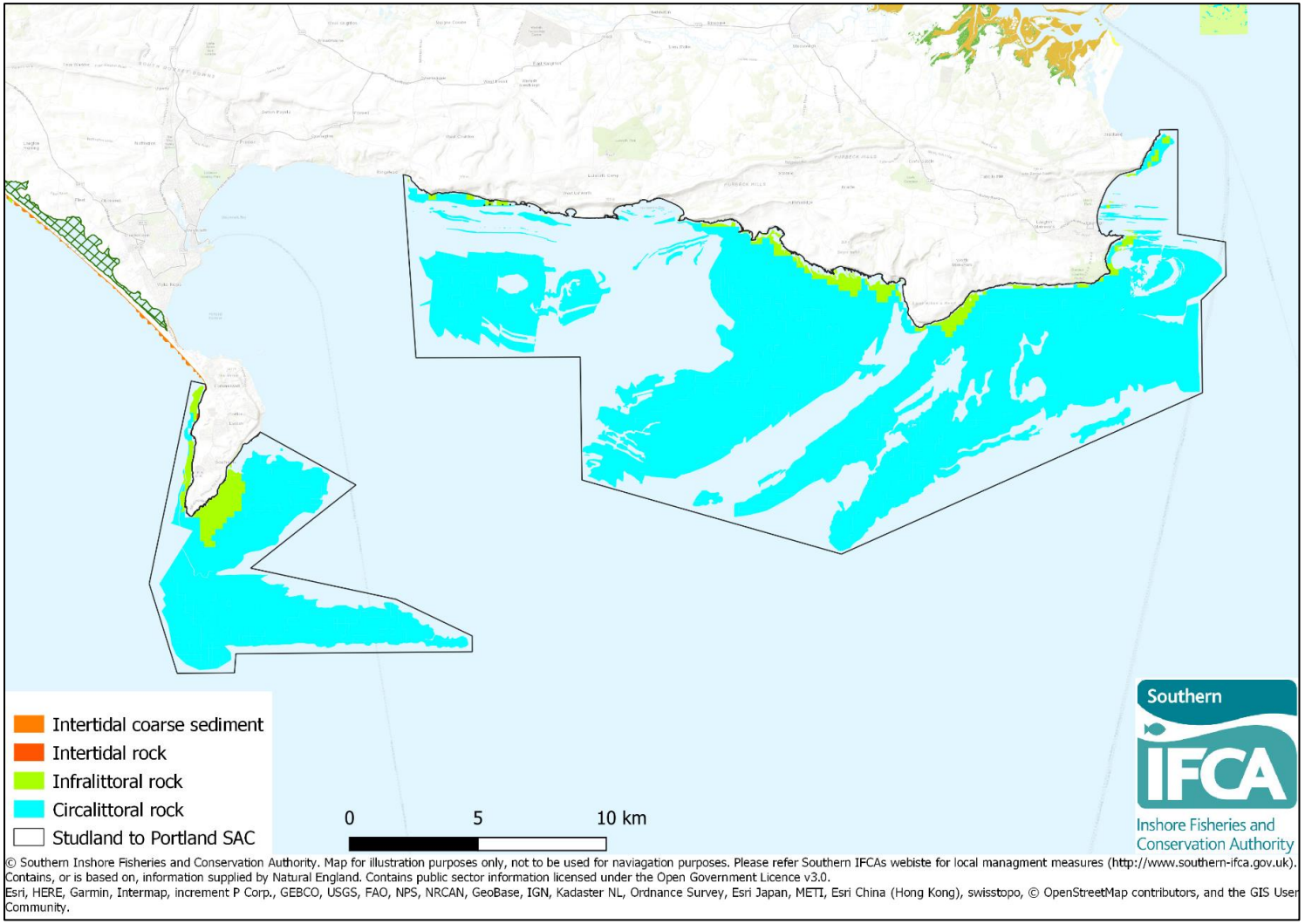


Figure 1. Site feature/ sub-feature map for the Studland to Portland Special Area of Conservation.

3.0 Fishery Profile

During 2015/16, a fishery for live wrasse developed within the Southern IFCA district, with exploitation partially taking place inside the Studland to Portland SAC (1.72% of the total SAC area).

Wrasse are used as cleaner fish in Scottish salmon farms to remove sea-lice as a biological alternative to the use of anti-parasitic chemical treatments. Of the six species which occur on the south coast of England, four represent the target species of the fishery. These include Corkwing wrasse (*Symphodus melops*), Goldsinny wrasse (*Ctenolabrus rupestris*), Rock cook wrasse (*Centrolabrus exoletus*) and Ballan wrasse (*Larus bergylta*). Ballan wrasse have proved to be the most popular species due to their survivability and feeding efficiency.

In the first two years of the fishery wrasse were predominantly targeted using fish traps, typically baited in short strings and soaked for 24 to 48 hours. The number of traps used by each vessel varies and the Wrasse Fishery Guidance (see section 5.0) stipulates a pot limitation of 80 traps per vessel. However, towards the end of the 2017 season and into the 2018 season catching wrasse using handlines became more popular. This was because the size of the trap entrances no longer enabled Ballan wrasse (and to a lesser extent the other species) at the new Minimum Conservation Reference sizes and above to enter the traps.

In 2019, handline activity was used to target ballan wrasse, whilst pot fishing was used to catch the other four species. However, in 2020, due to a change in demand from wrasse buyers, the fishery return to being a dominantly pot fishery targeting corkwing and goldsinny wrasse.

Potting and handline activity for wrasse occurs subtidally, although close inshore (no deeper than 10 metres), over infralittoral rocky ground characterised by heavy kelp and seaweed cover; the favoured inshore habitat type for wrasse species.

The fishery operates on a seasonal basis and in 2016 and 2017 from April/May to October. From 2018 however, a four-month fishery closed season applied between April and June inclusive (as outlined in the Wrasse Fishery Guidance) which will continue to apply in forthcoming seasons. Therefore, the seasons operate from 1st July to October/November and will continue to do so. Fishers do not fish beyond late October/ November due to the small size of their vessels which restricts what weather they can fish in particularly in the latter part of Autumn.

It is important to contextualise the level of live wrasse removed as part of this fishery, by comparing it to the quantities of wrasse taken in some parts of the country for use as pot bait. The use of wrasse as bait for crab and lobster pot fisheries has been a longstanding practice. The quantities of wrasse retained as bait is difficult to quantify because wrasse are often not landed and therefore not recorded.

4.0 Assessments Completed to Date

The table below sets out the assessments completed to date and their outcome.

Trigger Point	Feature/ Sub-feature	Gear Type	Assessment Type (tLSE/HRA)	Assessment Outcome	Management Measures	Document Reference
Emerging Fishery	Reef – Circalittoral rock, Infralittoral rock, Subtidal stony reef	Fish traps	tLSE	Maybe likely significant effect.	Wrasse Fishery Guidance; Vessel Used in Fishing Byelaw	SIFCA/TLSE/02/007
Emerging Fishery	Reef – Circalittoral rock, Infralittoral rock, Subtidal stony reef	Fish traps	HRA	No adverse effect on site integrity.	Wrasse Fishery Guidance; Vessel Used in Fishing Byelaw	SIFCA/HRA/02/002
2 and 7	Reef – Circalittoral rock, Infralittoral rock, Subtidal stony reef	Hand lines	tLSE	Maybe likely significant effect.	Wrasse Fishery Guidance; Vessel Used in Fishing Byelaw	SIFCA/TSLE/02/008
2 and 7	Reef – Circalittoral rock, Infralittoral rock, Subtidal stony reef	Hand lines	HRA	No adverse effect on site integrity.	Wrasse Fishery Guidance; Vessel Used in Fishing Byelaw	SIFCA/HRA/02/003

5.0 Management Relevant to this Monitoring and Control Plan

Vessels Used in Fishing Byelaw – whilst not intended for any particular gear/feature interaction specifically, this byelaw prohibits commercial fishing vessels over 12 metres from fishing within the Southern IFCA district. The reduction in the size of vessels restricts the type of gear that can be used and the level of static gear that can be worked.

Minimum Conservation Reference Size Byelaw – minimum sizes for wrasse species when caught within the Southern IFCA District

- Ballan wrasse (*Labrus bergylta*) 18cm;
- Corkwing wrasse (*Symphodus melops*) 14cm;
- Goldsinny wrasse (*Ctenolabrus rupestris*) 12cm;
- Rock cook wrasse (*Centrolabrus exoletus*) 12cm.

Wrasse Fishery Guidance – following IFCA byelaw making guidance, Southern IFCA developed a suite of non-statutory measures in June 2017 for any person commercially fishing for live wrasse within the Southern

IFCA. The measures are based on best-available evidence and are designed to maintain a sustainable population of wrasse and to enable the enjoyment of the species by other users.

- **Maximum conservation reference sizes** – All live wrasse outside of the following size ranges should be returned to the fishery immediately:

    - Ballan wrasse: 28cm;
    - Corkwing wrasse: 22cm;
    - Rock cook wrasse: 18cm;
    - Goldsinny wrasse: 18cm;
    - and all live Cuckoo wrasse (L*abrus mixtus*) should be returned to the fishery immediately.

- **No take zones** (Annex 1) – All forms of commercial fishing for live wrasse should not take place within the coastal areas (Figure 2):

    - Within Poole Rocks Marine Conservation Zone1;
    - From Broad Bench (50º 36.496' N 002º 08.776'W) to Anvil Point (50º 35.466'N 001º 57.588'W);
    - From Grove Point (50º 32.965'N 002° 24.947'W) to Portland Bill (50º 30.818'N 002° 27.352'W);
    - From Chesil Cove (50º 33.549'N 002° 26.940'W) to a point East of Burton Mere (50 º 41.063'N 002°41.409'W);
    - From the base of Golden Cap (50º 43.381'N 002º 50.400'W) to the Southern IFC District west boundary (50º 43.136'N 002º 56.792'W); and
    - within 50 metres of Swanage Pier, Weymouth Pier, West Bay Pier and Ferrybridge.

- **No pot fishing Zone** – Pot fishing for live wrasse should not take place between Portland Bill (50º 30.818'N 002° 27.352'W) and Chesil Cove (50º 33.549'N 002° 26.940'W).

- **Effort limitation** – Any fishing vessel using baited wrasse pots should use no more than 80 pots per vessel.

- **Closed season** – The commercial fishing for live wrasse should not take place between the 1st April and the 30th June each year.

- **Maximum fishing depth** – The placing of pots and handline fishing for wrasse should not take place in water deeper than 10 metres.

- **Catch data** – All first-sale buyers of wrasse must register with the UK fisheries authorities and submit a 'sales note'. In addition, fishers within the District are requested to submit monthly catch returns no later than 14 days after the month has ended. Catch return forms should detail the quantities of individual species caught (ballan, corkwing, goldsinny and rock cook), the fishing method, fishing locations and fishing effort.

- **Biosecurity and husbandry** – When storing and transporting live fish and seawater, appropriate biosecurity and husbandry measures should be followed in order to prevent the mixing of genetic structure and the transport of disease, parasites and non-native species.

6.0 Monitoring Activities

The table below outlines a set of variables and how they will be monitored. These include any new evidence relating to impacts or mitigating factors, any change in the fishery (gear type, intensity, scale) or environmental parameters.

Monitoring Variable	Monitoring Activity	Organisation Responsible	Reporting
Fishing effort (no. of vessels/ pots used)	Fishing effort, specifically the number of vessels participating within the fishery and the number of pots being fished, will be monitored through the submission of monthly catch returns from fishers under the Wrasse Fishery Guidance and through ongoing compliance and engagement systems. The monthly catch return requires fishers to record the number of pots worked per trip. This allows analysis of the number of pots hauled per trip and number of pots worked per fishing area. For handline activity the catch return form requires fishers to record the number of rods used and number of hours fished per trip. This allows analysis of the hours/handlines per trip and per fishing area. Sightings data will be recorded during regular compliance patrols, both afloat and ashore. This involves recording vessel information (boat name and number (PLN)), location (latitude and longitude position of activity) and gear type.	Southern IFCA	Data to be collated and analysed on an annual basis at the end of the fishing season.
Extent (fishing location)	Extent of the fishery will be monitored through the submission of monthly catch returns from fishers. The monthly catch returns require fishers to record fishing location per trip by fishing area, using a polygon system. This allows the analysis of fishing effort by fishing area, including inside and outside the SAC.	Southern IFCA	Data to be collated analysed on an annual basis at the end of the fishing season.
Landings	Landings data will be obtained from the monthly catch returns that are submitted by fishers. These will be cross-checked with buyers and seller's data submitted to Southern IFCA.	Southern IFCA/ MMO	Data to be collated analysed on an annual basis at the end of the fishing season.

Landings per unit effort (LPUE)	Landings per unit effort will be calculated from data recorded on monthly catch returns (number of wrasse landed/ number of pots/handlines). This allows analysis of LPUE over the fishing season. LPUE can be used as an indirect measure of target species abundance and is a useful indicator as to whether the fishery is operating sustainability i.e. a decreasing LPUE can indicate over exploitation.	Southern IFCA	Data to be collated analysed on an annual basis at the end of the fishing season.
Population structure	Catch sampling will be undertaken as part of the three-year research project co-ordinated by University of Exeter and, where possible, supported by Southern IFCA officers. At sea catch sampling will be conducted on an ad-hoc basis on board regular fishing trips, recording and measuring the catch of each pot, including target wrasse and bycatch species. The data collected from this can be used to provide information on the population structure of the catchable population through size frequency distribution analysis.	University of Exeter/ Natural England/ Southern IFCA	To be completed as part of the research project written report. Where available Southern IFCA data to be collated analysed on an annual basis at the end of the fishing season.
Non-compliance of Wrasse Fishery Guidance	Non-compliance will be monitored through regular compliance patrols and landing inspections conducted by IFCOs and partner agencies. Any non-compliance is recorded on an information report and is fed back through the Tactical Co-Ordination Group, held on a fortnightly basis. This forms part of Southern IFCAs intelligence-led and risk-based approach to enforcement and compliance.[11]	Southern IFCA/ MMO	Non-compliance is recorded in an information report and fed through the TCG process. The outcome of which establishes enforcement priorities for the following two weeks.
Condition assessment	Natural England is responsible for the condition monitoring of designated sites and this is undertaken every six years. Monitoring will provide an indication as to whether the condition of the site has changed during the six-year period.	Natural England	Written report/ Updated conservation advice
New evidence (functional role of wrasse)	The University of Exeter is undertaking a three-year PhD to investigate the functional role of wrasse within the inshore reef systems on the south west coast of England.	University of Exeter/ Natural England/ Southern IFCA	Written report completed at the end of the research project or as-and-when

[11] For more information on Southern IFCAs approach to achieving compliance and enforcement and the general principles followed by the Authority please see the Compliance and Enforcement Framework https://secure.toolkitfiles.co.uk/clients/25364/sitedata/files/EnforcementFramework.pdf

			significant information becomes available.
New evidence (fishery sustainability)	The fishery is subject to regular monitoring and new evidence relating to impacts or mitigating factors may become available. This includes scientific literature (i.e. potting impact studies or wrasse ecological function studies) or results from research being undertaken by other organisations, for example a study currently being undertaken by CEFAS on the spawning periods of different wrasse species.	Southern IFCA	Document new evidence on an annual basis at the end of the fishing season.

7.0 Triggers for Assessment

The table below outlines the monitoring variable and triggers for assessment.

No.	Monitoring Variable	Trigger for Assessment
1	Industry demand – the number of wrasses required by the salmon farms	A 25% increase in the total number of wrasses landed in the fishery.
2	Landings Per Unit Effort	A significant seasonal reduction in LPUE between years. Caution must be taken to ensure the reduction in LPUE can be attributed to the fishery and not seasonal changes in population.
3	Fishing effort – number of vessels working	A 25% increase in the number of vessels fishing from the baseline.
4	Fishing Effort – number of pots/ rod hours fished	A significant increase in the total effort of the fishery from the baseline.
5	An introduction of a new fishing gear type	The introduction of a new gear type.

6	Non-compliance of Wrasse Fishery Guidance	Repeated non-compliance of the Wrasse Fishery Guidance on an individual vessel basis.
7	New evidence relating to impacts or mitigating factors	New evidence to demonstrate the activity is potentially having a significant effect on the features of the SAC, adverse or positive. New evidence to better inform the Wrasse Fishery Guidance i.e. size at which maturity occurs to inform maximum and minimum conservation reference sizes or spawning period of wrasse species to inform closed season
8	Condition of the SAC	Decline in the condition of the SAC and the likely cause of the decline attributed to the fishing activity.

8.0 Assessment Feedback Process

Step 1: Ongoing monitoring activities (outlined in section 6.0).

Step 2a: For monitoring variable 6 - if there is repeated non-compliance of the Wrasse Fishery Guidance go Step 3.

Step 2b: For monitoring variables 1 to 5 & 8 - if one (or more) of the monitoring variables (outlined in section 7.0) are triggered:

- According to the steps taken, reassess the Habitat Regulations Assessment, starting with a test of likely significant effect (tLSE).
- If deemed to have a LSE, undertake an appropriate assessment (together making a HRA). If deemed to have no LSE no further action is necessary, go back to step 1.
- If deemed to have an adverse effect on site integrity go to step 3. If deemed to have no adverse effect on site integrity no further action is required, go back to step 1.

Step 2c: For monitoring variable 8 - A periodic review of the HRA should be completed every 6 years in line with condition assessment of the SAC.

- If deemed to have an adverse effect on site integrity go to step 3. If deemed to have no adverse effect on site integrity no further action is required, go back to step 1.

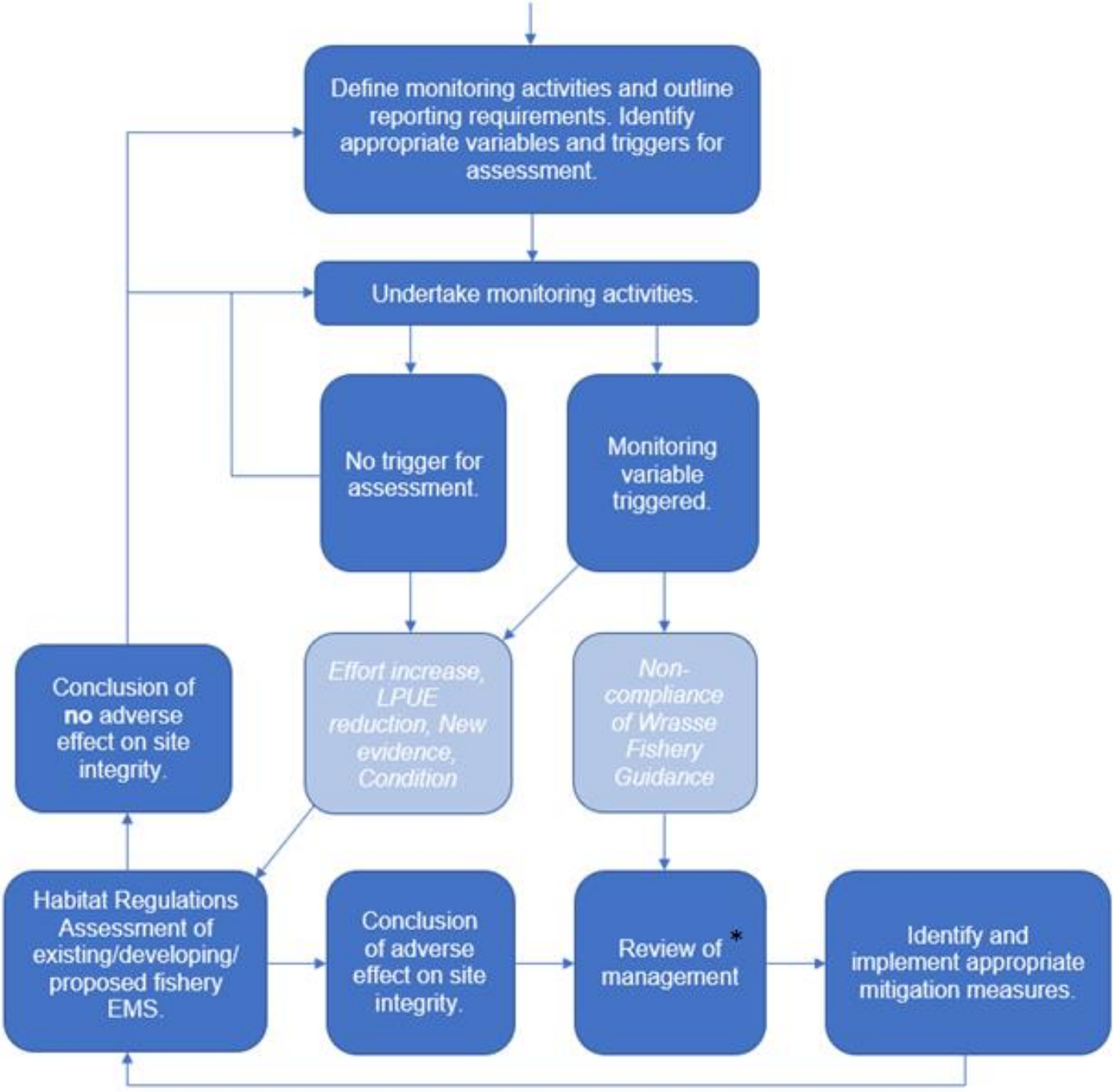
Step 3: Review of management[12]

- Identify and document issues with current management approach.
- Identify and implement appropriate mitigation measures to prevent adverse effect on site integrity and/or repeated non-compliance. Mitigation measures may include new or changes to existing management including emergency measures[13] (depending on the circumstances), additional monitoring or data collection, increase awareness and/or stakeholder engagement.
- Once mitigation measures are in place update the Monitoring and Control Plan and HRA (if appropriate), then return to step 1.

[12] Whilst this feedback process is important in triggering a review of management in the light of changes to the fishery, new evidence or non-compliance with existing voluntary guidance, a review of management by Southern IFCA is an ongoing process. As part of this process, a requirement for management related to the harvesting and taking of specific marine resources for live trade and aquaculture has been identified. For further details need section 8.0 Planned Management.

[13] Section 157 of the Marine and Coastal Access Act 2009 allows an IFCA to make emergency byelaws. The IFCA may make an emergency byelaw in circumstances where it considers there is an urgent need for a byelaw and that the need to make the byelaw could not reasonably have been foreseen.

8.1 Assessment Feedback Process Schematic



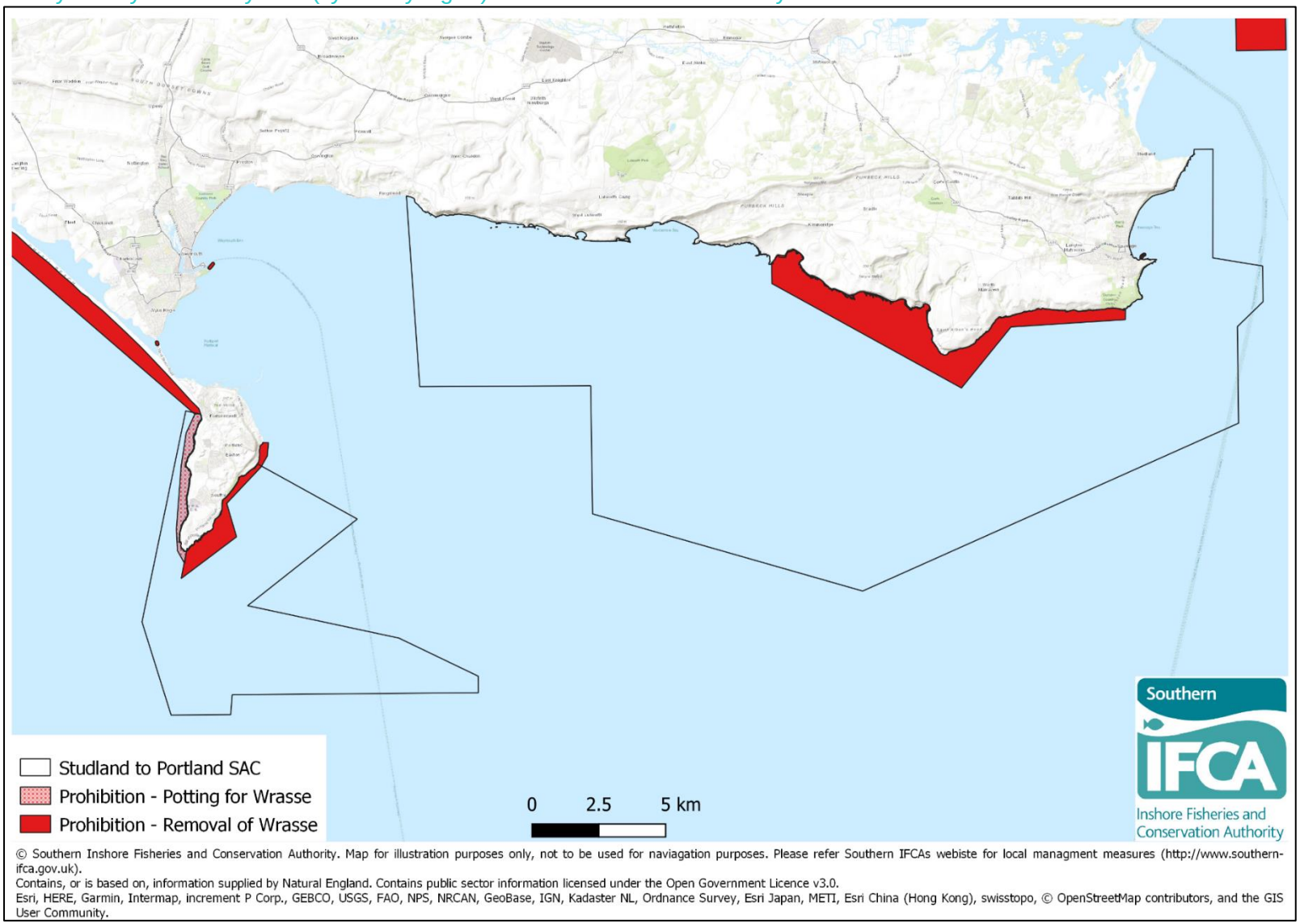
*Whilst this feedback process is important in triggering a review of management in the light of changes to the fishery, new evidence or non-compliance with existing voluntary guidance, a review of management by Southern IFCA is an ongoing process. As part of this process, a requirement for management related to the harvesting and taking of specific marine resources including fish for live trade has been identified. For further details need section 8.0 Planned Management.

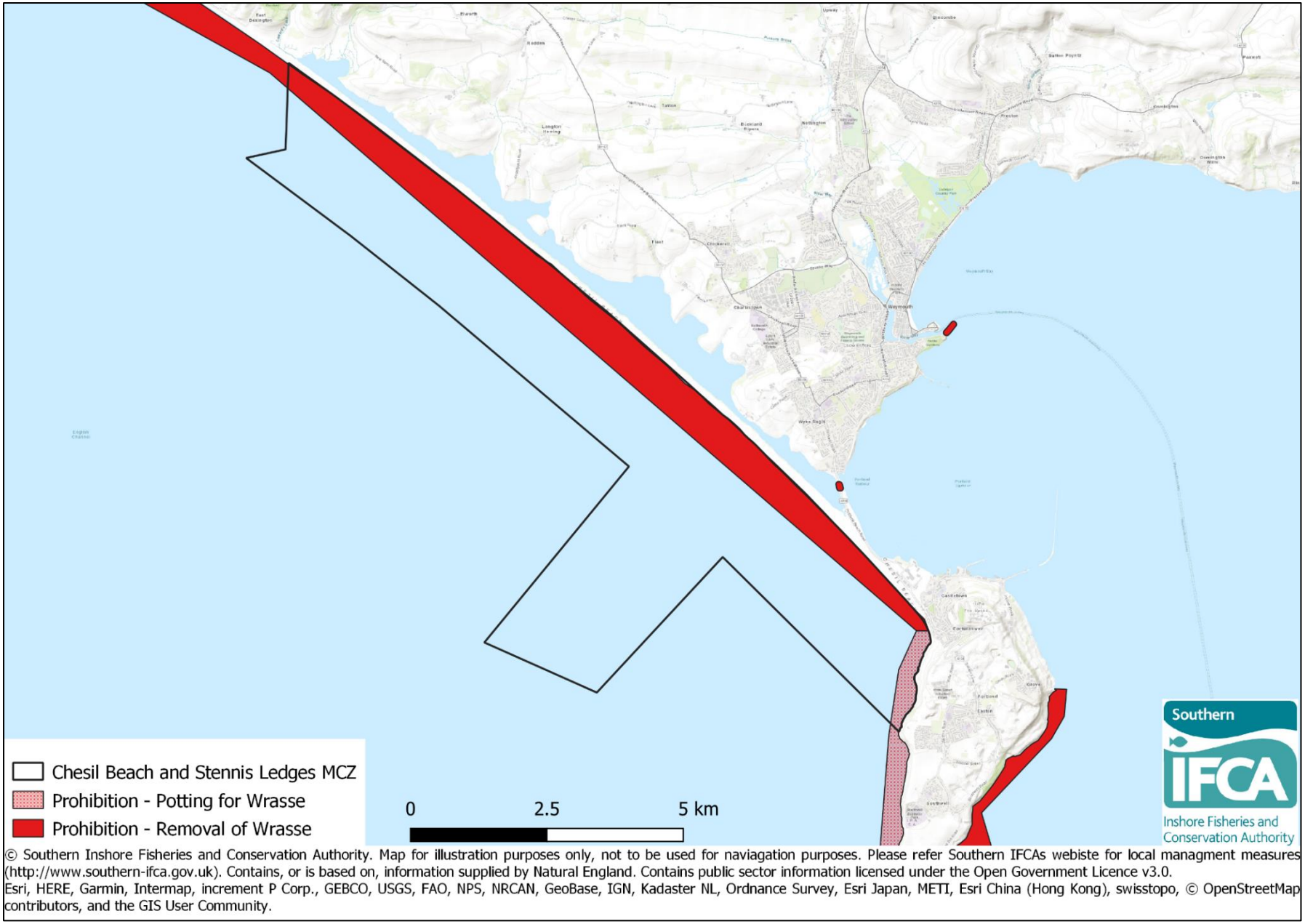
9.0 Planned Management

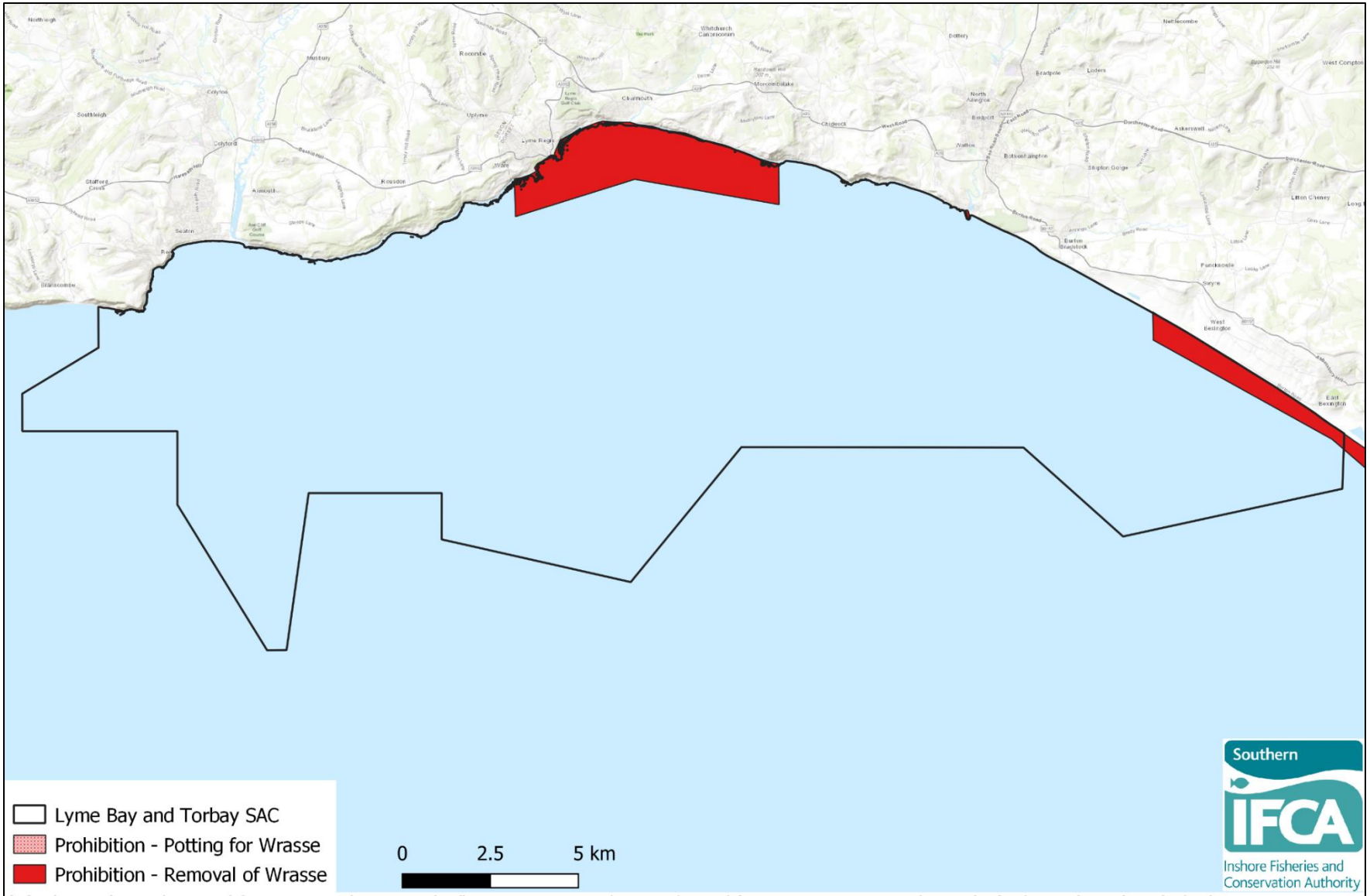
A review of management by Southern IFCA is an ongoing process and ensures workstreams reflect the nationally agreed Vision and Success Criteria. Currently, the Authority is reviewing its management arrangements for potting and netting within the Southern IFCA district. However, fishing for wrasse does not fall under either of these workstreams.

As described in Southern IFCA's five-year plan the Authorities next phase of the review process has identified a requirement to manage the harvesting and taking of specific marine resources for the purposes of live trade and aquaculture. Following the conclusion of the netting review, resources will be allocated for the development of management if needed to address this requirement. Any new management, if needed, will look to incorporate the removal of fish (including wrasse species and lump suckers) for live trade and aquaculture purposes, as well as the removal of shellfish (including), for the purposes of relaying and harvesting of seaweed.

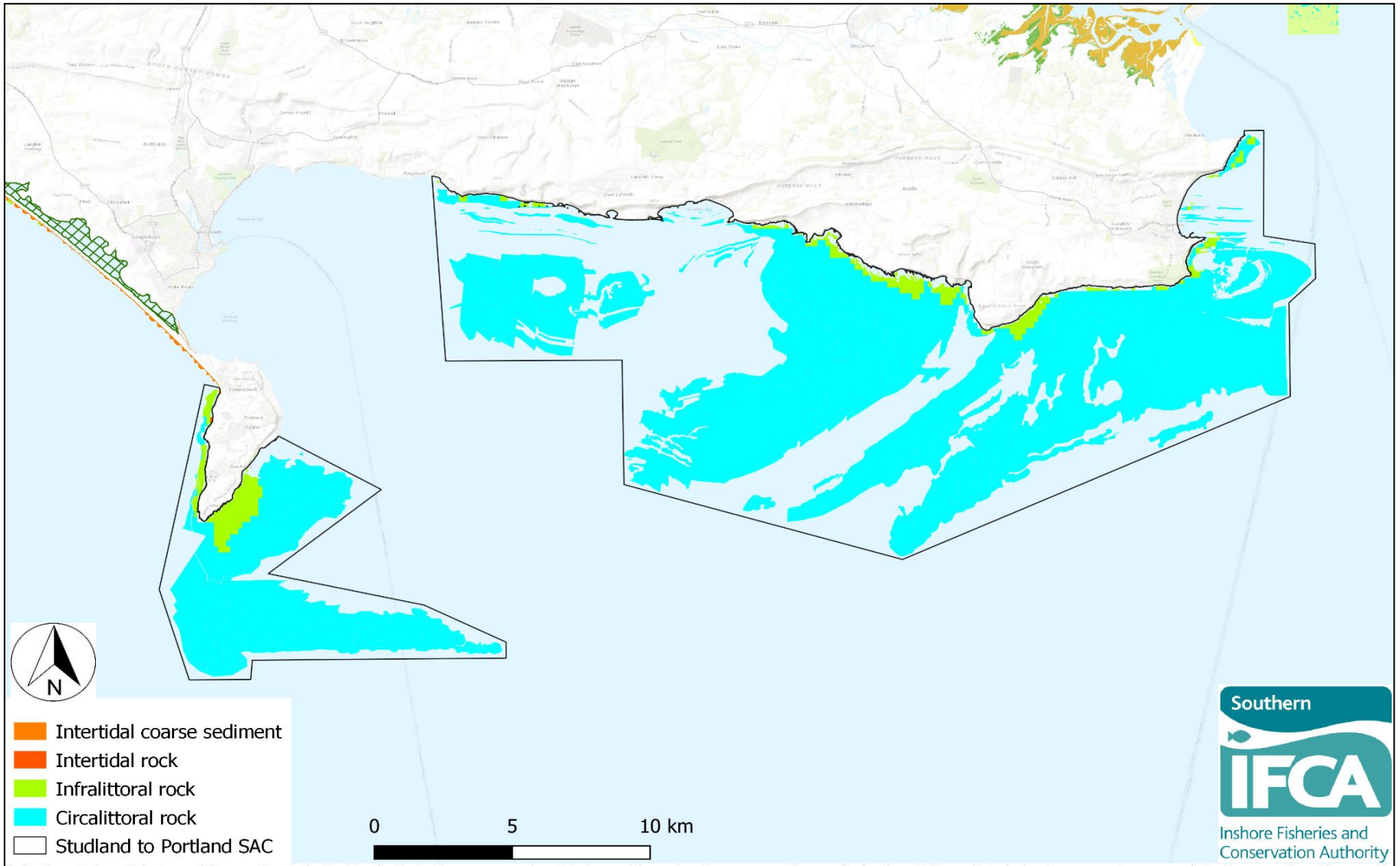
Annex 1 - No take zones (including no potting zone) in the Studland to Portland Special Area of Conservation and Poole Rocks MCZ, Chesil Beach and Stennis Ledges MCZ and Lyme Bay and Torbay SAC (Lyme Bay region) as outlined the Wrasse Fishery Guidance.







Annex 3: Site feature map for Studland to Portland SAC.



24th January 2023

Our ref: 418543

Your ref: HRA/02/004

Southern Inshore Fisheries & Conservation Authority
Unit 3 Holes Bay Park
Sterte Avenue West
Poole
Dorset
BH15 2AA

Sterling House,
Dix's Field,
Exeter,
EX1 1QA

Dear Sarah,

Natural England's formal advice for Southern IFCAs Habitats Regulations Assessment for the Wrasse Fishery Reassessment: Studland to Portland SAC

Thank you for requesting Natural England's advice regarding the Habitats Regulations Assessment (HRA) for the live wrasse fishery, combining both commercial pot and rod and line fishing methods, operating within the Studland to Portland Special Area of Conservation (SAC), which was received on 20th December 2022. Associated with this request we also received the Southern Inshore Fisheries & Conservation Authority's (SIFCA) Habitats Regulations Assessment (HRA) (HRA – Studland to Portland – Wrasse Fishery – 1.7 Final Draft) and the recent Monitoring and Control Plan report for the fishery (Wrasse Fishery Report 2022 Final Draft). The following constitutes Natural England's formal statutory response.

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

1 Overview

Natural England has previously provided formal advice to SIFCA on the management of the emergent live wrasse fisheries during the HRA process for the fixed gear (pot) fishery[1], which began prosecuting wrasse stocks in the SIFCA district in 2015-2016 and again as the fishery method shifted to include rod and line fishing in 2019[2]. This process was undertaken to fulfil SIFCA's obligation as the competent authority under the Conservation of Habitats and Species Regulations 2017 (as amended ('the Habitats Regulations'). Regulation 63 of the Habitats Regulations requires appropriate steps to be taken to avoid the deterioration of natural habitats and habitats of species within the UK's national site network, as well as significant disturbance of the features for which the area has been designated.

Natural England understands that this HRA has been carried out as part of a review of the fishery in 2022. This review was triggered when the wrasse fishery reached the Monitoring Variable 1 trigger level (industry demand) as outlined in the agreed Monitoring and Control Plan, whereby more than the agreed number of wrasse (41,031 fish) were removed from Dorset's waters by this fishery. It is understood that 42,295 fish were taken for use in Scottish salmon farms. This value represents a 29% increase on the baseline figure from 2018 as opposed to the agreed maximum number of fish that could be harvested, which was 25% above the 2018 baseline.

[1] Formal advice from Natural England to SIFCA dated 23 June 2017 re live wrasse fishery Studland to Portland SAC. Habitats Regulations Assessment

[2] Formal advice from Natural England to SIFCA dated 20 June 2019 re commercial wrasse rod and line fishery. Studland To Portland SAC. Habitats Regulations Assessment

2 Habitats Regulations Assessment

2.1 Test of Likely Significant Effect

Natural England agrees with SIFCA's conclusion, that a likely significant effect can not be ruled out and that, as per previous advice, regarding both methods of harvesting wrasse there are two pressures that must be considered as part of an appropriate assessment. These are:

- Abrasion/ disturbance of the substrate on the surface of the seabed (only associated with pot fishing for wrasse)
- Removal of target species i.e. targeted wrasse species

2.2 Appropriate Assessment

2.2.1 Abrasion/ disturbance of the substrate on the surface of the seabed (only associated with pot fishing for wrasse)

SIFCA reports that wrasse harvesting using pots continues to decline with 3 pot fishing trips taking place in 2022 inside the SAC, while handline fishing continues to become more popular with the majority of rod fishing for wrasse taking place off the west and south sides of Portland Bill[3]. NE also understands that the combined areas exposed to fishing within the SAC make up approximately 9.9% of the infralittoral rock subfeature[4].

Together with the reported low levels of potting activity and evidence outlined regarding impacts of low intensities of potting, Natural England agrees that it can be confidently concluded that abrasion or disturbance of the substrate on the surface of the seabed associated with this fishery is not causing an adverse affect on site integrity. Please note, Natural England assumes that no aspects of the fishery involve anchoring.

2.2.2 Removal of target species i.e. targeted wrasse species

As per previous advice provided Natural England advises that wrasse species should be regarded as playing a valuable role in reef communities as mesopredators, epibenthic grazers and facultative cleaners (removing parasites of other fish) and that the removal of significant numbers of wrasse could have negative impacts on these communities. However, wrasse are not a designated feature of the Studland to Portland SAC and so impacts to the integrity of the site by their removal is limited to only those attributes pertinent to the structure of infralittoral reef communities. Natural England understands that other species also function as mesopredators and epibenthic grazers and that wrasse share aspects of their ecological niche.

SIFCA highlights that effort and landings per unit effort (LPUE) have largely remained unchanged (aside from corkwing wrasse) and that voluntary management mitigatory measures, such as minimum and maximum sizes, are in place with relatively high levels of compliance. When considered alongside the Monitoring and Control Plan that is in place and the limited area of the subfeature that is exposed to this activity, Natural England agrees that it can be confidently concluded that no adverse effect on site integrity is occurring.

2.2.3 In-combination assessment

Based on the assertion made that recreational angling does not target wrasse and that any caught are released, Natural England agrees that wrasse harvesting in-combination with recreational angling is not likely to lead to an adverse effect on site integrity.

3 Wider stock management

3.1 Monitoring and Control Plan

Natural England welcomes the ongoing implementation of the monitoring and control plan as a crucial aspect of management allowing relevant evidence to be gathered to support the review process.

[3] Southern IFCA Live Wrasse Fishery Monitoring and Control Report 2022
[4] Southern IFCA HRA – Studland to Portland SAC – Wrasse Fishery Reassessment (SIFCA/HRA/02/004)

However, we are disappointed to read that analysis has been limited due to missing catch return form (CRF) data[1]. SIFCA state that submission of these data declined in 2022 and this has prevented confident comparison of between year fishing effort. Natural England suggests that this should be made a mandatory requirement to ensure improved submissions.

We also welcome the use of triggers for each monitoring variable in the plan and recognise the system to limit the number of fish landed, seemed to be effective in 2022 after total number of fish removed triggered an assessment and SIFCA was able to liaise with the wrasse buyers and remove the demand.

3.2 Knowledge gaps

However, when considering wider stock management of this group of species and their intrinsic importance to the wider ecology of the area, Natural England has outstanding concerns in terms of knowledge gaps within the plan and lack of confidence in the data being gathered.

As stated in previous advice[5] Monitoring Variable 1 of the Monitoring and Control Plan relies on a seemingly arbitrary trigger of 25% above a baseline value (i.e. the amount of fish landed in the first year of the fishery + 25%). When considering the wider stock it is unknown whether the wrasse populations in this area at this time were being sustainably exploited and so there is a risk that this figure does not reflect a population being harvested within safe biological limits.

Natural England understands that the findings of the wrasse harvesting PhD are due to be published in summer 2023. This is likely to improve the collective understanding of the impacts of the fishery on the wrasse populations but if it is unable to inform a stock assessment then we advise that efforts to carry out a stock assessment be made a priority. The 'Wrasses Complex Fisheries Management Plan (FMP)', scheduled for commencement in 2023, should provide a mechanism for improving the understanding of the fishery on wider stocks and the development of a stock assessment.

Monitoring Variable 2 is crucial for providing best available evidence for understanding effort and depends on the ability of the IFCA to analyse the data to assess changes in LPUE between years. As stated in the HRA this seems to have been compromised by the lack of CRF data submitted and the lack of confidence in the accuracy of the returns. We therefore recommend making this a mandatory requirement.

Previously NE has advised that additional information is needed regarding post-release mortality. SIFCA has acknowledged that survival rates could vary depending on how the fish has been caught, therefore this is a knowledge gap for both the commercial fishery and recreational angling that needs plugging urgently. These data are needed to add confidence to the premise that most fish survive and that catch and release is a viable mitigatory measure.

In future reviews of the fishery, NE would welcome a more detailed analysis of the areas exposed to this fishery (both inside designated sites and outside). A mapped output would be especially welcome.

4 Summary

Natural England would like to express its concern that the threshold value for triggering an assessment was breached and while we understand the voluntary measures put in place did enable the fishery to be effectively closed, we recommend that further robust measures are put in place to prevent this from recurring, especially as there is low confidence in the meaningfulness of the threshold value and if demand is increasing.

Natural England agrees with the conclusions drawn by SIFCA's HRA, that the fishery is not having an adverse effect on site integrity of the Studland to Portland SAC, for the reasons set out above and on the basis that a relatively robust adaptive management strategy is in place, as mitigation.

However, we are aware of wrasse declines in other parts of the UK (e.g. Plymouth, Scotland) and further afield (e.g. Ireland and Norway) as a result of pressure from this industry. Therefore, we continue to have ongoing concerns regarding the management of the wider wrasse stocks and

[5] Formal advice from Natural England to SIFCA dated 20 June 2019 re commercial wrasse rod and line fishery.

recommend that the evidence used by the Monitoring and Control Plan should be improved and triggers reviewed to ensure it remains as a robust approach to managing this fishery sustainably.

Finally, Natural England would like to thank SIFCA for their cooperative approach to the overall effort regarding the wrasse fishery thus far and looks forward to working together in the future to further ensure the sustainability of the fishery.

For any queries relating to the content of this letter please contact me using the details provided below

Yours sincerely,

Gavin Black
Marine Senior Adviser

Southern Inshore Fisheries and Conservation Authority

MARKED D

OFFICER'S REPORT

FISHERIES INDUSTRY SCIENCE PARTNERSHIP PROJECTS

Report by DCO Birchenough

A. Purpose of the Report

For Members to receive an overview of Fisheries Industry Science Partnership (FISP) Projects that the Southern IFCA are supporting.

B. Recommendation

1. That Members note the report.

1. Background

1.1 The Southern IFCA has been working with academic institutions to provide support for projects proposed under the Fisheries Industry Science Partnership (FISP) program. The FISP scheme is part of the UK Seafood Fund, a £100 million fund set up to support the long-term future and sustainability of the UK fisheries and seafood sector. The fund is managed by Defra. The FISP scheme specifically aims to improve and share knowledge of fisheries and aquaculture by funding data collection and research to support sustainable fisheries management, sharing £24 million of the funding allocated through the UK Seafood Fund for science and innovation. All FISP projects must be a partnership between a member of the UK seafood industry and a research organisation.

1.2 There have been four rounds of funding under the FISP scheme, the latest, and last, round having closed on the 19th January 2023.

Angling for Sustainability

1.3 Under Round 3 of the FISP scheme, the project 'Angling for Sustainability' received £738,175, running for two-years from 1st January 2023. The project is a partnership between the University of Plymouth, the Professional Boatman's Association, Natural England, the Angling Trust and the Southern IFCA.

1.4 The aim of the project is for researchers to work with fishing communities in Dorset and the Solent to assess the habitats and movement of species including sharks, skates, rays and black bream. Through doing so the project aims to ensure the sustainability and survival of the region's Charter boat fishing industry by working with the industry and other partners to help fill the evidence gaps needed for effective, informed management.

1.5 The specific actions of the project are:

- To establish a network of acoustic receivers across the Dorset and Solent region

- To tag and track 200 black bream and 100 elasmobranchs: undulate ray, tope and smooth-hound
- To train skippers and fisheries managers on data collection and equipment maintenance
- To collect an 18 month data set of black bream and elasmobranch movements
- To host stakeholder workshops to disseminate the project results

1.6 The expected outcomes of the project are:

- To provide data on seasonal and daily movement for black bream and elasmobranchs with a focus on fishing hotspots and three MCZs, to establish migration patterns, site fidelity and any effects on nesting
- To inform the conservation advice of the protected nesting black bream feature within the Dorset MCZs and protected shark and ray species within the Solent Marine Area
- To inform the Fisheries Management Plans (FMPs) for black bream and the Southern North Sea and Channel Skates and Rays
- To inform future management of essential fish habitat areas to promote species recovery

1.7 The Southern IFCA, as a project partner, has committed to providing an in-kind contribution to the project which is within the Authority's resource capacity. This contribution is through the provision of officers for 12 days over the two years to help with maintenance of the acoustic receivers, to attend project steering group meetings to provide advice and input in our capacity as fisheries managers and to facilitate liaison between the project and stakeholders through our Stakeholder Groups (Recreational Angling Sector Group, Conservation Group and South Coast Fishermen's Council).

Proposed Projects

1.8 The Southern IFCA has also been part of two bids to the FISP scheme under Round Four of the funding stream, applications for Round 4 closed on 19th January 2023.

1.9 One of these projects is with the University of Plymouth, the second is with the University of Portsmouth, led by Dr Ian Hendy. Due to the sensitive nature of individual applications, it is not possible to publicise specific details of these projects whilst they are in the bid stage. However, the commitment from Southern IFCA as a project partner for both of these projects is also within the Authority's resource capacity and centres around in-kind contributions of access to survey work which the Authority already carries out annually and attendance at project steering group meetings to provide advice and input in our capacity as fisheries managers. As with the funded project there would also be the ability to facilitate communications between the project leads and stakeholders through our Stakeholder Groups.

1.10 It is anticipated that results of the current round of bids will be announced over the next few months.

Southern Inshore Fisheries and Conservation Authority

MARKED E

OFFICER'S REPORT

LIVE WRASSE FISHERY MONITORING AND CONTROL REPORT 2022

Report by IFCO Condie

A. Purpose of the Report

To receive a report on the Live Wrasse Fishery describing the outcomes of the data analysis for the 2022 fishing season.

B. Recommendation

1. That Members receive the report.

C. Annexes

1. Live Wrasse Fishery Monitoring and Control Report 2022

1. Background

1.1. The Southern IFCA wrasse fishery supplies live wrasse to UK Salmon farms for use as natural sea lice control. In the District, wrasses are removed from the Weymouth and Portland area, in and around the Studland to Portland Special Area of Conservation (SAC).

1.2. Data is collected for the fishery each season through the provision of count data from buyers on the number of wrasse landed and through Catch Return Forms (CRF) submitted voluntarily by fishers engaged in the fishery. These forms include the ability to provide information on fishing location, effort and catch.

1.3. The data is analysed each year following the end of the fishing season and Generalised Linear Models (GLM) are used to consider which variables (Year, Day of Year or Area Fished) best describe the variation in 'Landings per Unit Effort' (number of wrasse per pot).

1.4. The data from this report is used to help inform monitoring of the fishery under the fishery's Monitoring and Control Plan and the data from the 2022 report has been used in the review of the Habitats Regulations Assessment for the fishery.

2. The 2022 Wrasse Season

2.1. The 'Live Wrasse Fishery Monitoring and Control Report 2022' (Annex 1) has been produced to analyse the 2022 fishery data.

2.2. A summary of the results is as follows:

- A total of 42,296 wrasses were landed in the 2022 season, which represents 1,261 fish (3.1%) above the Monitoring Variable 1 trigger point under the Monitoring and Control Plan set as 41,035 (2018 baseline).
- The number of vessels active within the fishery remained the same. The Authority rejected a request for an additional vessel to take part in the fishery, due to the impact this may have on the fishing effort.
- The catch return data (submitted voluntarily) was compared to the previous four years of data:
    - Statistical analysis of change in Landings Per Unit Effort (LPUE) data showed that the variable 'year' does not explain the variation in LPUE of different groups/species of wrasses, only Corkwing $LPUE_{pot}$ showed a significant difference between years with the $LPUE_{pot}$ for 2022 significantly higher than in 2021.
    - The variation in wrasse LPUE for the different groups/species is best explained by variable 'fishing area'. The highest potting LPUEs, with corkwing wrasse comprising the majority of the catch, are found outside of the SAC where larger shallow areas are available to fish. Rod LPUE is highest off Portland Bill inside the SAC with rod fishery ballan wrasse LPUE consistently higher in this area compared to others.
    - Where 'Day of Year' was identified as being an explanatory variable, the pattern was different for Ballan in isolation, with an increase in $LPUE_{pot}$ throughout the season, than for all wrasse species combined where there was a decline in average $LPUE_{pot}$ by the end of the year with a peak in August
- Inspections for compliance with the regulated MCRS and voluntary maximum sizes found 100% compliance.
- Compliance with the voluntary requirement to submit catch return forms improved between 2018 (80%) and 2021 (94%). However, the level of submission did decline between 2021 and 2022 to 84%.

2.3. The analysis used on this data has been shown to provide useful information which can help inform the management of the live wrasse fishery and allows for identification of the variables influencing the LPUE. This methodology will continue to be used to analyse data from this fishery in line with the requirements set out by the management scheme.

MARKED E – ANNEX 1

Live Wrasse Fishery

Monitoring and Control Report 2022

The wrasse fishery supplies live wrasse to UK Salmon farms for use as natural sea lice control. In the Southern IFC District, wrasses are removed from the Weymouth and Portland area, in and around the Studland to Portland Special Area of Conservation (SAC). In accordance with requirements under the Conservation of Habitats and Species Regulations, the fishery has been assessed through a Habitats Regulations Assessments (HRA) in order to ensure the activity does not lead to an adverse effect on site integrity. The fishery is managed through regulated Minimum Conservation Reference Size (MCRS) and voluntary 'Wrasse Fishery Guidance' and is monitored in line with a Monitoring and Control Plan (MCP). This fishery report describes the outcomes of the data analysis for the 2022 season used to assess the monitoring variables and their trigger points described in the MCP.

Method

Southern IFCA receive count data on the number of wrasses landed to buyers. The buyer data is used to monitor the removal from the fishery during and at the end of the fishing season.

All fishers voluntarily submit wrasse Catch Return Forms (CRF) throughout the season which details their daily fishing location, effort and catch. CRF data is used to calculate Landings Per Unit Effort (LPUE) for either 'pot' or 'rod and line' fishing methods.

Generalised Linear Models (GLM), run in the programming software 'R' are used to consider which variables (Year, Day of Year or Area Fished) best describe the variation in LPUE.

Further information on methodology is available on the Southern IFCA website 'Live Wrasse Fishery' page.

Fishing Compliance, Effort and Location

In 2022, Southern IFC officers carried out 22 compliance inspections and found 100% adherence to the MCRS and fishery guidance maximum sizes. Ten fishing vessels participated in the 2022 season for only 14 weeks. Monitoring and control variable one (25% increase in industry demand) was exceeded after 10 weeks of fishing; the total number of wrasses removed was 3.1% above the trigger point, set on the 2018 baseline *(Table 1)*.

Table 1. Comparative fishing effort levels for the Southern IFCA wrasse fishery 2018 to 2022.

	2018	2019	2020	2021	2022
No. wrasses landed	32,825	42,295	34,299	36,331	42,296
No. fishing vessels	9	11	9	10	10
No. weeks fishing	17	17	18	17	14

Similar to previous years, the majority of fishing effort trips reported on CRFs occurred outside the SAC, in Balaclava Bay, Portland Harbour, Weymouth Bay and Ringsted.

In 2022, many fishers resumed rod and line fishing whilst continuing to pot fish. Rod fishing usually targets the west side and bill off the Isle of Portland, and therefore more wrasse fishing occurred within this area of the SAC compared to 2020/21. It should be noted, that most rod and line fishing stopped in mid-August due to order fulfilment complications and issues at salmon farms. In 2022, only three pot fishing trips were reported to occur within the SAC and overall pot fishing activity appeared to decrease. Comparisons of fishing effort between years, (total fishing trips, no. of pots and rod hours fished) cannot be confidently described due to missing data in all years. Compliance with CRF submission had increased over time with 80%, 86%, 84% and 94% of the total fish removed recorded on CRFs for the years 2018 to 2021 respectively. However, in 2022, this fell to 84%.

Authors: E Condie & C Smith, December 2022

Live Wrasse Fishery

Monitoring and Control Report 2022

Landings Per Unit Effort (LPUE)

In order to complete the Generalised Linear Model analysis, the number of wrasses landed are separated into five categories: total wrasse LPUE per pot, mixed wrasse LPUE per pot (excluding ballan), ballan wrasse LPUE per pot, corkwing wrasse LPUE per pot, and Ballan wrasse LPUE per rod hour fished. The following figures show the variables which best explain the variation in LPUE and the corresponding significance levels for each level of a variable. Note: colours indicate either year or area fished and are displayed in the relevant key. To simplify plots, where many significant interactions were found, only the NS interactions have been highlighted and therefore all other interactions were found to be significant.

Total and Mixed Wrasse $LPUE_{pot}$

When 2022 data was analysed, the variation in total $LPUE_{pot}$ was best explained by the day of year (DOY) (Figure 1). This is a change from 2021 in which fishing area best explained the data. The mean Total $LPUE_{pot}$ was lower at the end of a season than the start and reached a peak towards the end of August. This is similar to the trend seen in 2020.

The variation in mixed $LPUE_{pot}$ was best explained by year in 2021, but when 2022 data was included, this changed to fishing area (Figure 1). Portland Harbour and Weymouth Bay (Fishing Area 4) had a significantly higher $LPUE_{pot}$ than the other areas. It should be noted that no fishing trips have been recorded as occurring in area 8 since 2019.

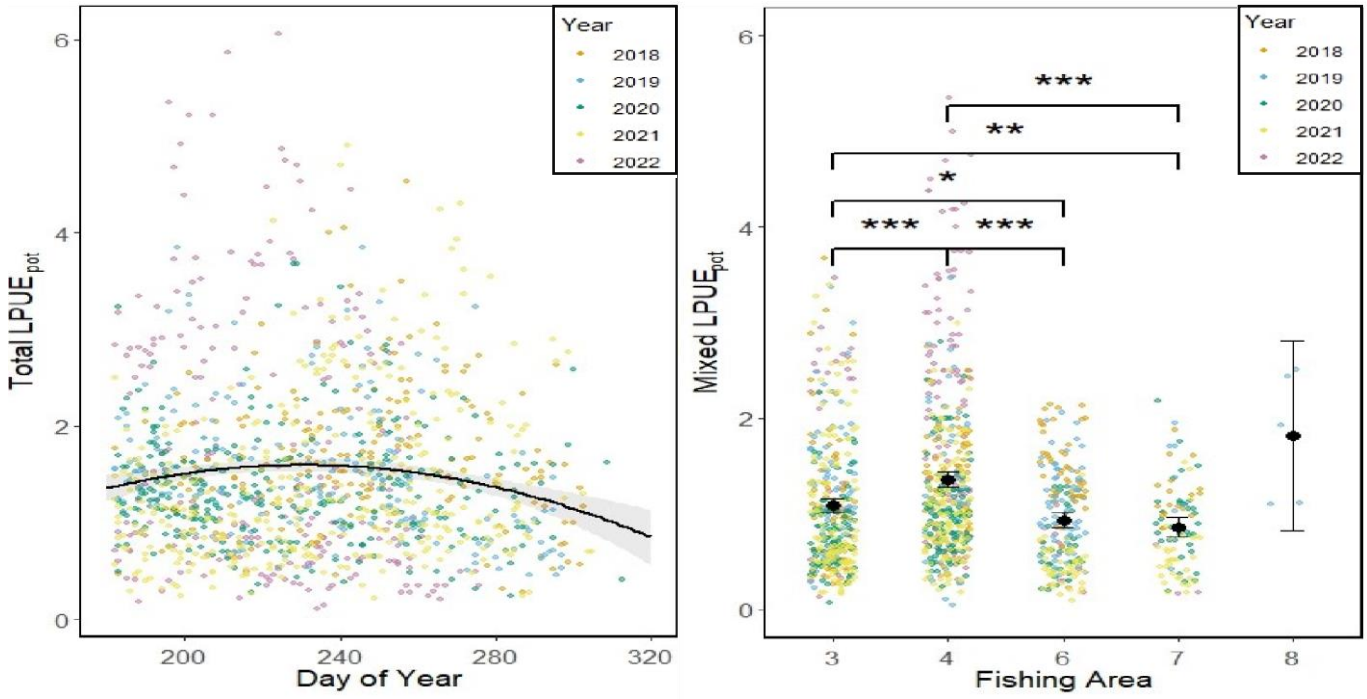


Figure 1: *Predicted effects of* ***(left)*** *the day of year (DOY) on $LPUE_{pot}$ of total wrasses and* ***(right)*** *fishing area on $LPUE_{pot}$ for mixed wrasses caught in the Southern IFCA District. Error bars show 95% confidence intervals around the predicted means as estimated by the Generalized Linear Models. Fishing Area 3= Balaclava Bay, 4= Portland Harbour and Weymouth Bay, 6= Ringstead Bay, 7 = White Nothe to Lulworth, 8=Lulworth to Broadbench. *** represents <0.001 significance and * represents <0.05 significance. Pot fishing is not permitted around the Isle of Portland (Area 1 and 2). Portland Harbour and Weymouth bay (Area 4 and 5) have been combined for this analysis because fishers are active in both areas on the same day.*

Authors: E Condie & C Smith, December 2022

Live Wrasse Fishery

Monitoring and Control Report 2022

Corkwing $LPUE_{pot}$

In 2022, the variation in Corkwing $LPUE_{pot}$ was explained by both fishing area and year (Figure 2). Significantly higher LPUE was found in Balaclava Bay and Portland Harbour to Weymouth Bay, than in Ringstead Bay, and White Nothe to Lulworth. 2022 is the second-year data on Corkwing has been collected and in which significantly higher LPUE was observed than for 2021 (Figure 2).

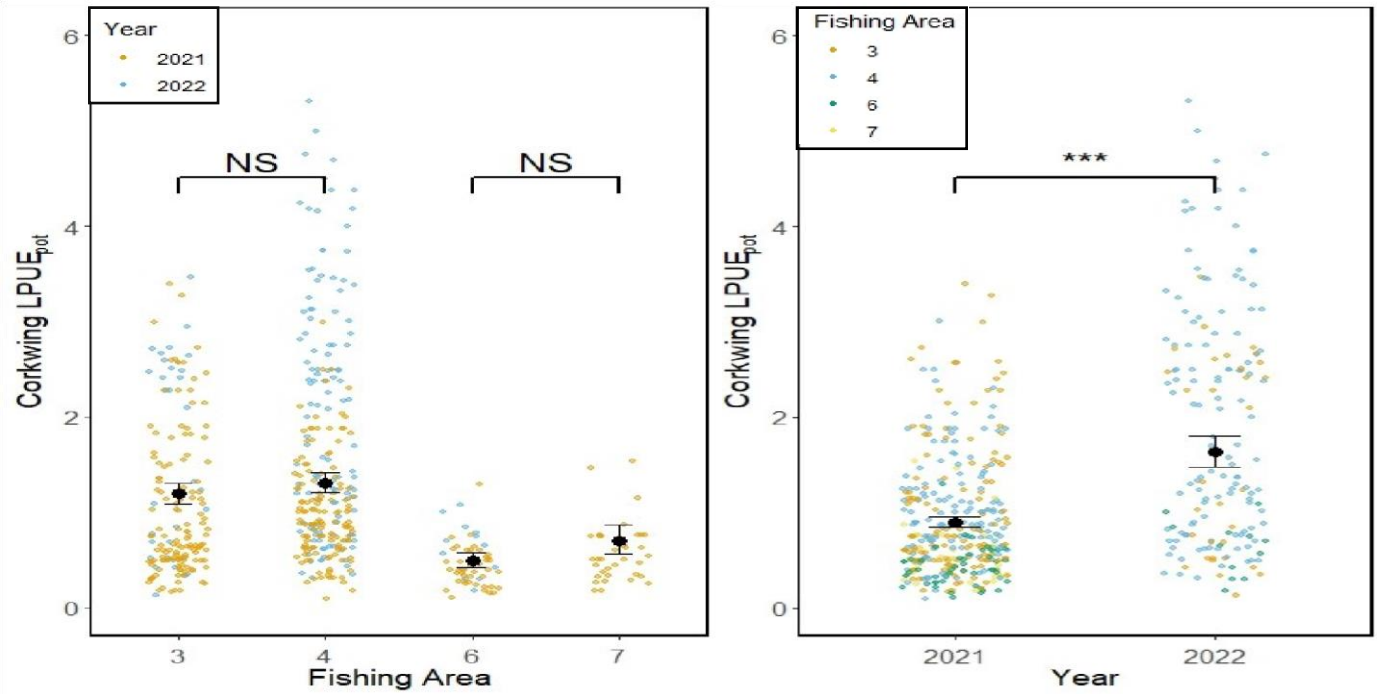


Figure 2: *Predicted effects of* ***(left)*** *fishing area on $LPUE_{pot}$ of Corkwing Wrasse and* ***(right)*** *year on $LPUE_{pot}$ for Corkwing Wrasse caught in the Southern IFCA District. Error bars show 95% confidence intervals around the predicted means as estimated by the Generalized Linear Models. Fishing Area 3= Balaclava Bay, 4= Portland Harbour and Weymouth Bay, 6= Ringstead Bay, 7 = White Nothe to Lulworth. *** represents <0.001 significance and NS = Not Significant. Pot fishing is not permitted around the isle of Portland (Area 1 and 2). Portland Harbour and Weymouth bay (Area 4 and 5) have been combined for this analysis because fishers are active in both areas on the same day.*

Ballan $LPUE_{pot}$ and $LPUE_{rod}$

In 2021, ballan $LPUE_{pot}$ was explained by all three studied variables, where as in 2022, DOY was the only factor which explained the variation (Figure 3). $LPUE_{pot}$ increased throughout the season.

In 2022, the variation in ballan $LPUE_{rod}$ was best explained by fishing area (Figure 3), a change from 2021 when year was the best fit. Significantly higher $LPUE_{rod}$ is found in Portland Harbour to Weymouth Bay (Fishing Area 4) than all other areas. It should be noted that Balaclava Bay, Portland Harbour and White Nothe to Lulworth were removed from the analysis due to too few data points.

Authors: E Condie & C Smith, December 2022

Live Wrasse Fishery

Monitoring and Control Report 2022

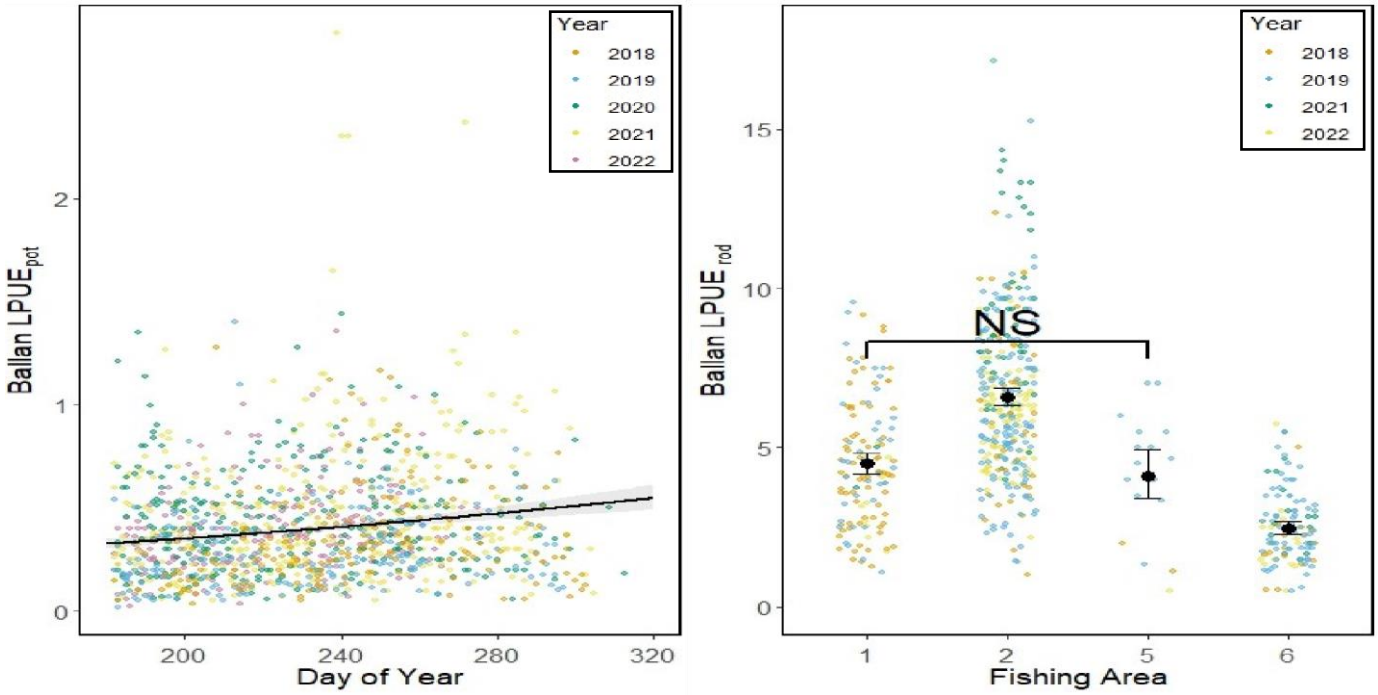


Figure 3: *Predicted effects of* ***(left)*** *fishing area on $LPUE_{pot}$ of Ballan Wrasse and* ***(right)*** *year on $LPUE_{rod}$ for Ballan Wrasse caught in the Southern IFCA District. Error bars show 95% confidence intervals around the predicted means as estimated by the Generalized Linear Models. Fishing Area 1= West Side, 2= Portland Bill, 5=Weymouth Bay, 6= Ringsted Bay. NS = Not Significant. All other interactions significant. The lack of data points in areas 3,4 and 7 required the areas to be removed from the analysis. Too few or zero rod fishing trips have occurred in Areas 3, 4, 7, and 8 for these to be included within the analysis.*

Summary of results

1. In 2022, the number of fish purchased was 29% higher than the 2018 baseline, which triggered monitoring and control variable one of the Monitoring and Control Plan.
2. Between year fishing effort data (total fishing trips, no. of pots and rod hours fished) cannot be compared with confidence, due to missing catch return form data. Data is submitted voluntarily by fishers and should be interpreted with caution. However, it was clear that fishers resumed the use of rod and line fishing in 2022.
3. To date, the data analysis does not suggest significant changes in the LPUE for the wrasse fishery between years. Where there has been a significant difference in LPUE this is seen to be an increase (Corkwing).
4. Fishing area best explains the variation in LPUE for most wrasse categories. Pot LPUE is highest outside of the SAC where the majority of fishing effort is concentrated. Rod LPUE is highest off Portland Bill where the majority of rod fishing occurs.
5. Where Day of Year was identified as being an explanatory variable, the pattern was different for Ballan in isolation, with an increase in $LPUE_{pot}$ throughout the season, than for all wrasse species combined where there was a decline in average $LPUE_{pot}$ by the end of the year with a peak in August

Authors: E Condie & C Smith, December 2022

Discussion

In 2022, the total number of wrasse landed was 1,261 fish (3.1%) above the Monitoring Variable 1 trigger point under the Monitoring and Control Plan set as 41,035 fish (2018 baseline). Fishing effort cannot be statistically compared to the baseline year or other previous years due to incomplete data. Based upon a visual analysis of the available data an increase in rod fishing hours was seen in 2022, compared to 2020 and 2021, although it cannot be determined if this is a statistically significant increase.

The fishing area continues to explain much of the variation in LPUE. Portland Harbour and Weymouth Bay which are outside of the SAC, are consistently the most productive for species other than ballan wrasse caught by pot fishing, the majority of which are known to be corkwing wrasse. Henly et al. (2021) and Halvorsen et al., (2020) found that Corkwing wrasse are more abundant at shallower depths. Portland Harbour and Weymouth Bay are both the two largest fishing areas, over which the depth is not more than 10m, each spanning more than 5.4km^2. It is conceivable that the higher LPUE found in these areas may be a result of the size of the available area which offers preferred habitat for corkwing wrasse. Whilst other fishing areas such as Ringsted Bay and White Nothe to Lulworth have only a narrow band of seabed 10m or shallower.

Meanwhile, in the rod fishery ballan wrasse LPUE was consistently higher around the Isle of Portland. CPUE of ballan wrasse has been shown to be positively linked with wave exposure (Halvorsen et al., 2020) and with larger tidal range (Henly et al., 2021). Portland Bill is very exposed to strong wave action, and the strong tidal stream creates daily races. Ballan wrasse may be more abundant in this area due to these factors.

Contrasting seasonal effects were found in the Total $LPUE_{pot}$ and Ballan $LPUE_{pot}$. Ballan wrasse landings increase with day of year. As a nest guarding species, spawning between April and August (Darwell et al.,1992) more individuals may be active and entering the fishery from August.

Total $LPUE_{pot}$ rises from July until the end of August before declining. It is possible that ballan wrasse are responsible for the rise until August, along with other nest building species, corkwing and rockcook (Darwell et al.,1992). However, this may also be explained by the relationship of corkwing LPUE with temperature (Henly et al., 2021). Corkwing account for the majority of pot caught individuals and as sea temperatures increase throughout July and August corkwing may become more active and enter the fishery. Halvorsen et al. (2020) found that CPUE of Corkwing and Ballan wrasse increased between June and September, before declining in October, similar to the pattern found here for total wrasse.

The results discussed in this report have been interpreted from data submitted under voluntary Wrasse Fishery Guidance Measures adhered to by fishers. Whilst the data quality has improved since 2018, its analysis should be interpreted with caution.

References

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