# Document Control

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| **Title** | **HRA – Studland to Portland SAC – Handlines** |
| **SIFCA Reference** | HRA/02/003 |
| **Author** | C Smith |
| **Approver** | S Pengelly |
| **Owner** | Southern IFCA |
| **Template Used** | HRA Template v1.2 |

**Revision History**

| Date | Author | Version | Status | Reason | Approver(s) |
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| 01/04/2019 | C Smith | 1.0 | Draft | | |
| 02/04/2019 | C Smith | 1.1 | Draft | Amendments to AA literature section | |
| 05/04/2019 | C Smith | 1.2 | Draft | Minor edits, References | |
| 08/04/2019 | C Smith | 1.3 | Draft | Minor Formatting Edits | |
| 23/04/2019 | C Smith | 1.4 | Draft | Addition to annex | |
| 26/04/2019 | C Smith | 1.5 | Draft | Amendments to in-combination | |
| 20/05/2019 | C Smith | 1.6 | Draft | Amendments to effort/scale/monitoring | S Pengelly |
| 28/05/2019 | C Smith | 1.7 | Draft | Addition of infralittoral statistic | |
| 03/06/2019 | C Smith | 1.8 | Draft | S Pengelly Amendments | |
| 19/07/2019 | C Smith | 1.9 | Final | NE agreement with conclusions received. Final comments addressed | |

This document has been distributed for information and comment to:

| Title | Name | Date sent | Comments received |
|---|---|---|---|
| Natural England | Alex Maydew | 24/04/2019 | Verbal comments received requesting clarification of effort, scale, location and monitoring of the activity and that this be added to the HRA. |
| Natural England | Alex Maydew | 03/06/2019 | 21/06/2019. Minor comments made on the document. Overall, Natural England does not disagree with SIFCA's conclusion of no adverse effect on site integrity when management measures are considered as mitigation. However, Natural England's own conclusion is based on the premise of a reported decline in fishery effort for target-species wrasse." |
| Southern IFCA Members | All Members | 13/06/2019 | N/A |

# 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):** Circalittoral rock, Infralittoral Rock, Subtidal stony reef

**Generic Sub-Feature(s):** Subtidal bedrock reef; Subtidal boulder and cobble reef; Subtidal mussel bed on rock

**Gear type(s) Assessed:** Handlines

# Technical Summary

A fishery for live wrasse developed in 2015/2016, a portion of which occurs within the Studland to Portland SAC and as such fell outside the deadline of the revised approach. Since 2017 there has been a shift in fishing practice from the use of fish traps to handline fishing for live wrasse, particularly Ballan wrasse, in response to the introduction and adoption of Southern IFCA's wrasse fishery guidance measures. This does not represent an increase in fishing effort and the number of participants. In 2019 it is anticipated that 9 vessels with participate in the live wrasse fishery with 7 of those using handlines. Not all vessels fish in the SAC and some are known to utilise areas around Portland Harbour, Weymouth Bay and Ringstead. The main area for this activity is located at Portland Bill.

Wrasse are typically targeted using handlines in waters no deeper than 10 metres, over infralittoral rocky ground typically characterised by heavy kelp and seaweed cover. The dominant target species are Ballan wrasse (*Larus bergylta*), although other wrasse species may be targeted.

The potential pressures likely to be exerted by the wrasse fishery upon the designated features were identified as removal of target species.

Impacts related from the removal of target species are considered as direct impacts on wrasse populations and indirect impacts on the wider ecosystem. The wrasse fishery is size-selective and as such can remove certain groups from the population leading to variety of implications related to population dynamics, demography and reproduction. Wrasse species however do not appear within any species list within Conservation Packages associated with the site. Direct impacts on wrasse populations in isolation are not considered relevant in the context of this assessment. Only the resulting effects from the removal of the species are considered.

When considering the wider indirect ecosystem impacts of wrasse removal, there is a lack of evidence on ecological function of wrasse species and subsequent impacts on temperate reef habitats. As such, best available evidence was used to infer potential impacts, with research highlighting potential concerns around the removal of wrasse as an epibenthic grazer (of small algal grazing invertebrates) and subsequent changes in algal biomass.

When considering the scale of the fishery, the relatively small area subject to fishing (1.72% of the SAC, and 9.9% of the infralittoral feature), the targeting of one predominant wrasse species leaving a good population of other species, good compliance with the Wrasse Fishery Guidance measures and the detailed Monitoring and Control Plan in place for the fishery it was concluded the potential indirect effects of wrasse removal will not occur at levels significant enough to have an adverse effect on site integrity and is therefore not considered to hinder the sites conservation objectives.

Wrasse fishery guidance, introduced in June 2017, outlines a wide range of different measures and as such makes the fishery one of the most restricted in the Southern IFCA district. Whilst aimed at ensuring the long-term sustainability of the fishery through preventing over-exploitation of wrasse populations, the fishery guidance will also benefit the wider ecosystem. In particular, safeguarding against potential impacts related to the ecological function and wider ecosystem and thereby reducing potential risks associated with uncertainties surrounding these effects. Additionally, the fishery will be closely monitored and a feedback process established to allow for regular review and adaptive management as detailed in the Monitoring and Control Plan.

Handline fishing, by both commercial and recreational fishers, targeting other fish species takes place within the site, most notably for bass, pollack, plaice, brill and turbot.

# 1 Introduction

## 1.1 Need for an HRA assessment

Southern IFCA has duties under Regulation 9(3) 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. 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.

Management of European Marine Sites is the responsibility of all competent authorities which have powers or functions which have, or could have, an impact on the marine area within or adjacent to a European Marine Site (EMS). Under section 38 of the Species and Habitats Regulations (2017):

"The relevant authorities, or any of them, may establish for a European marine site a management scheme under which their 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."

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 (EMS). The objective of this revised approach is to ensure that all existing and potential commercial fishing activities in European Marine Sites are managed in accordance with Article 6 of the Habitats Directive. Articles 4.1 and 4.2 of the Birds Directive also require that the Member States ensure the species mentioned in Annex I and regularly occurring migratory bird species are subject to special conservation measures concerning their habitat in order to ensure survival and reproduction in their area of distribution. This affords Special Protection Areas (SPAs) a similar protection regime to that of Special Areas of Conservation (SACs).

This approach was implemented using an evidence based, risk-prioritised, and phased approach. Risk prioritisation was informed by using a matrix of the generic sensitivities of the sub-features of the EMS to a suite of fishing activities as a decision-making tool. These sub-feature-activity combinations were categorised according to specific definitions, as red[1], amber[2], green[3] or blue[4].

Activity/feature interactions identified within the matrix as red risk had the highest priority for implementation of management measures by the end of 2013 in order to avoid the deterioration of Annex I features in line with obligations under Article 6(2) of the Habitats Directive.

Activity/feature interactions identified within the matrix as amber risk required a site-level assessment to determine whether management of an activity was required to conserve site features. Activity/feature interactions identified within the matrix as green also required a site level assessment if there were "in combination effects" with other plans or projects.

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[1] Where it is clear that the conservation objectives for a feature (of sub-feature) will not be achieved because of its sensitivity to a type of fishing, - irrespective of feature condition, level of pressure, or background environmental conditions in all EMSs where that feature occurs – suitable management measures will be identified and introduced as a priority to protect those features from that fishing activity or activities.

[2] Where there is doubt as to whether conservation objectives for a feature (or sub-feature) will be achieved because of its sensitivity to a type of fishing, in all EMSs where that feature occurs, the effect of that activity or activities on such features will need to be assessed in detail at a site specific level. Appropriate management action should then be taken based on that assessment.

[3] Where it is clear that the achievement of that conservation objectives for a feature is highly unlikely to be affected by a type of fishing activity or activities, in all EMSs where that feature occurs, further action is not likely to be required, unless there is the potential for in combination effects.

[4] For gear types where there can be no feasible interaction between the gear types and habitat features, a fourth categorisation of blue is used, and no management action should be necessary.

Site level assessments were carried out in a manner consistent with the provisions of Article 6(3) of the Habitats Directive, but were also required to meet the 6(2) responsibilities of Southern IFCA as a competent authority. The aim of the assessments was to consider if any activity could significantly disturb the species or deteriorate natural habitats or the habitats of the protected species. From this, a judgement was made as to whether or not the conservation measures in place were appropriate to maintain and restore the habitats and species for which the site has been designated to a favourable conservation status (Article 6(2)). If assessments identified that additional conservation measures were required, these had to be implemented or be in the process of implementation by the end of 2016. Southern IFCA completed this process by the 2016 deadline. Following the end of 2016, the need for assessment i.e. if a change in the status of an existing fishery or a new fishery arose, will be reviewed by Southern IFCA on an as and when basis.

A new fishery for live wrasse, caught using baited traps, emerged during 2015-16. A portion of the fishery falls within the Studland to Portland SAC. In 2017/2018 there was a shift in the methods used to target wrasse from pots to handlines alongside an increase in fishing vessels. As stated above, Southern IFCA is carrying out a site level assessment to determine whether or not the fishing activity will have a likely significant effect on Reefs of the Studland to Portland SAC, and on the basis of this assessment whether or not it can be concluded that the fishery will not have an adverse effect on the integrity of this EMS.

## 1.2 Documents reviewed to inform this assessment

- Natural England's risk assessment Matrix of fishing activities and European habitat features and protected species[5]
- Reference list[6] (Annex 1)
- Natural England's Regulation 35 Conservation Advice (March 2013)[7]
- Natural England's Conservation Advice (September 2018)[8]
- Site map(s) – sub-feature/feature location and extent (Annex 2)
- Fishing activity map (Annex 3)
- Fisheries Impact Evidence Database (FIED)
- Natural England Advice on the management of the emerging wrasse fishery (Annex 4)
- Natural England Scoping advice on the Handline fishery (Annex 8)

[5] See Fisheries in EMS matrix: http://www.marinemanagement.org.uk/protecting/conservation/documents/ems_fisheries/populated_matrix3.xls
[6] 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.)
[7] http://publications.naturalengland.org.uk/publication/3282207
[8] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030382&SiteName=studland&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

# 2 Information about the EMS

- 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 2 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 very 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

# 3 Interest feature(s) of the EMS categorised as ‘Red’ risk and overview of management measure(s)

- Reef

A red risk interaction between bottom towed gears and reef features were identified and subsequently addressed through the creation of the ‘Bottom Towed Fishing Gear’ byelaw[9]. The ‘Bottom Towed Fishing Gear’ prohibits the use of any bottom towed fishing gear within sensitive areas (characterised by reef features

[9] Bottom Towed Fishing Gear Byelaw:
https://secure.toolkitfiles.co.uk/clients/25364/sitedata/files/PDFbyelaw_bottomtowedfishi.pdf

or eelgrass/seagrass beds) in European Marine Sites throughout the district. The byelaw also states that that if transiting through a prohibited area carrying bottom towed fishing gear, all parts of the gear are inboard and above the sea. Within the Studland to Portland SAC there are two prohibited areas which cover the extent of the reef features within the site. This was based on habitat mapping data provided by Natural England and ground truthing by Southern IFCA.

# 4 Information about the fishing activities within the site

## 4.1 Activities under Consideration/Summary of Fishery

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. Wrasse are used as cleaner fish in Scottish salmon farms to remove sea-lice in some case 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. The assessment in this HRA focusses on the handline fishery, however. As the fisheries are highly connected the effort, location, and scale of both gear types will be described. The fishery operates on a seasonal basis and in 2016 and 2017 the season ran from April to October. In 2018 the season was shortened and now runs from July to October.

## 4.2 4.2 Technical Gear Specifications

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

## 4.3 Effort, Location and Scale of Fishing Activities

In 2015/16 a fishery for wrasse 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 8 meters or less in length. In 2017, in response to developing Fishery Guidance measures, some participants trialled the use of handlines as their predominant fishing method to catch live wrasse.

In 2018, a change in the dynamic of the fishery occurred. The Wrasse Fishery Guidance measures limited the period over which fishers could target wrasse with a closed season from 1st April to 30th June. Furthermore, precautionary species size limits meant that fish traps were no longer optimal for the capture of ballan wrasse due to the pot entrance size. Over the course of the year nearly all participants switched to using handline methods to catch live wrasse, with a small number using fish traps to target the wrasse 'micro-species'.

In 2019, it is anticipated that up to nine vessels will participate in the area's live wrasse fishery, with seven predominantly using the handline method. Due to the increased effectiveness of wrasse husbandry, buyers have been reducing their year on year demand for live wrasse. This is due to a reduction in required stocking density, improved catch handling and transport practises leading to low mortality and a shift to obtaining wrasse form other areas including Scotland and Cornwall. Additionally, the successful industry buy-in of the Wrasse Fishery Guidance Measures has led to an overall reduction in the numbers of wrasse which are available to the industry, mainly through the minimum and maximum conservation reference sizes and reduced fishing season.

Handline activity for wrasse occurs subtidally, although close inshore, over infralittoral rocky ground typically characterised by heavy kelp and seaweed cover. This represents the favoured habitat for wrasse species. Typically, the activity occurs in shallow subtidal waters, of 10 meters depth and less due to the requirement that fish are retained alive, in a healthy state thereby restricting the depth over which fishers can target the species to prevent barotrauma effects. In 2016 and 2017, wrasse (pot and handline) fishing effort was concentrated in the Weymouth and Portland area, between Grove Point and Lulworth, with key areas from White Nothe to Ringstead and Portland Breakwater. In 2018, handline fishing predominantly occurred off of Portland Bill (see Annex 3 – note the scale of location data collection does not enable this to be well represented and therefore depicts the highest level of activity along the length of the west side of Portland).

The following calculations give a representative guide of the activities scale. The total known fished area within the SAC is illustrated in Annex 3, this equals 1.72% of the total SAC. The overlap between these known fished areas and the area of infralittoral reef habitat within the SAC is represented in Annex 3a, this equals 9.9% of the SAC's infralittoral habitats. These statistics have been calculated using the Natural England's Marine Evidence Package (March 2019) including the reefs infralittoral polygon layer. The potential fished areas were calculated using the 10m depth contour (the maximum allowable fishing depth as per the Wrasse Fishery Guidance). It is important to note that these statistics must be considered with the accuracy of the data used in mind. This includes the accuracy of the reef infralittoral polygon which will only include habitat for which Natural England has data, and the varied resolution of that data. For the potential fished area this includes the accuracy of the 10m depth contour. As well as, the consideration that this is not a fixed boundary at sea and therefore fishers are able to fish outside of this area (although, to do so would be contravening Southern IFCAs Wrasse Fishery Guidance).

Six wrasse species occur along the south coast, four of which form the target species of the fishery. These include Corkwing (*Symphodus melops*), Goldsinny (*Ctenolabrus rupestris*), Rock cook (*Centrolabrus exoletus*) and Ballan (*Larus bergylta*). Ballan wrasse have proved to be the most popular species due to their survivability and feeding efficiency. At the beginning of the 2017 season, boats solely targeted ballan wrasse in the size range of 12 to 28 cm. This size range later changed with the introduction of the Wrasse Fishery Guidance in June to 18 to 28 cm.

The number of wrasses caught per day varies depending on the time of year and number of handlines used. It is difficult to determine a 'typical' number of wrasses caught due to large daily variations, in combination with other factors (time of year, number of handlines used, quality of data provided by fishers). The wrasse season begins on 1st of July and ends in late October when weather conditions naturally restrict fishing.

# 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 a plan or project will cause a likely significant effect on an EMS[10]. Each feature/sub-feature was subject to a TLSE, the results of which are summarised in Table 1.

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

## 5.1 Table 1. Summary of LSE Assessment. Circalittoral rock; Infralittoral rock; Subtidal stony reef.

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| **1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?** | No | | |
| **2. What potential pressures exerted by the gear type(s) are likely to affect the feature(s)/sub-feature(s)?**<br><br>Natural England's Conservation Advice September 2018 | 3. **Is the feature(s)/sub-features(s) likely to be exposed to the pressure(s) identified?** | | |
| | **Infralittoral Rock** | **Subtidal stony reef** | **Circalittoral Rock** |
| 1. Abrasion/disturbance of the substrate on the surface of the seabed | OUT – Handlines 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 comes into contact with the seabed so there is unlikely to be a significant impact. | OUT – Handlines 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 comes into contact with the seabed so there is unlikely to be a significant impact. | OUT – Handlines 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 comes into contact with the seabed s there is unlikely to be a significant impact |
| 2. Removal of non-target species | OUT – The nature of commercial vessel handline activity leads to little bycatch of unwanted species due to the targeted gear used. Very occasionally pollock and bream are caught as bycatch. This is because fishers can use specific lures, baits and hook types to target the species they aim to catch. The barbless hooks on a jig-head with lead ball ensure that fish | OUT – The nature of commercial vessel handline activity leads to little bycatch of unwanted species due to the targeted gear used. Very occasionally pollock and bream are caught as bycatch. This is because fishers can use specific lures, baits and hook types to target the species they aim to catch. The barbless hooks on a jig-head with lead ball ensure that fish caught are not deep hooked | OUT – The nature of commercial vessel handline activity leads to little bycatch of unwanted species due to the targeted gear used. Very occasionally pollock and bream are caught as bycatch. This is because fishers can use specific lures, baits and hook types to target the species they aim to catch. The barbless hooks on a jig-head with lead ball ensure that fish caught are not deep hooked |

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| | caught are not deep hooked reducing the potential to damage large and small wrasse and other bycatch species which are returned to the water column alive. Wrasse handline fishing occurs in shallow waters, 10m depth or less therefore almost eliminating the likelihood of barotrauma impacts to non-target species particularly as 100% survivability of the target species is desired. As catch and release methods in general result in good survival rates of a range of different species (Annex 3) there is unlikely to be a significant effect on the feature from removal of non-target species. Furthermore, the pelagic fish species caught are not named features of the SAC nor are they keystone species or species of community importance. | reducing the potential to damage large and small wrasse and other bycatch species which are returned to the water column alive. Wrasse handline fishing occurs in shallow waters, 10m depth or less therefore almost eliminating the likelihood of barotrauma impacts to non-target species particularly as 100% survivability of the target species is desired. As catch and release methods in general result in good survival rates of a range of different species (Annex 3) there is unlikely to be a significant effect on the feature from removal of non-target species. Furthermore, the pelagic fish species caught are not named features of the SAC nor are they keystone species or species of community importance. | reducing the potential to damage large and small wrasse and other bycatch species which are returned to the water column alive. Wrasse handline fishing occurs in shallow waters, 10m depth or less therefore almost eliminating the likelihood of barotrauma impacts to non-target species particularly as 100% survivability of the target species is desired. As catch and release methods in general result in good survival rates of a range of different species (Annex 3) there is unlikely to be a significant effect on the feature from removal of non-target species. Furthermore, the pelagic fish species caught are not named features of the SAC nor are they keystone species or species of community importance. |
| 3. Removal of target species | IN wrasse– the primary target species in the SAC are (bass, wrasse, pollack and plaice). Plaice, bass and pollock have been assessed for bedrock reef and stony reef communities in a separate tLSE. Secondary species include black seabream and cod.<br><br>One of the main handline fisheries within the SAC is the live wrasse fishery in which they predominantly remove Ballan wrasse, as well as other | IN wrasse– the primary target species in the SAC are (bass, wrasse, pollack and plaice). Plaice, bass and pollock have been assessed for bedrock reef and stony reef communities in a separate tLSE. Secondary species include black seabream and cod.<br><br>One of the main handline fisheries within the SAC is the live wrasse fishery in which they predominantly remove Ballan wrasse, as well as other wrasse species | IN wrasse– the primary target species in the SAC are (bass, wrasse, pollack and plaice). Plaice, bass and pollock have been assessed for bedrock reef and stony reef communities in a separate tLSE. Secondary species include black seabream and cod.<br><br>One of the main handline fisheries within the SAC is the live wrasse fishery in which they predominantly remove Ballan wrasse, as well as other wrasse species |

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| | wrasse species (Corkwing, Goldskinny, Rock cook and Ballions).<br><br>Despite being a mobile species, wrasse 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 also 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<br><br>functioning of associated communities.<br><br>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 October) allowing the fish stocks eight months in which they are not targeted by commercial fishers.<br><br>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 | (Corkwing, Goldskinny, Rock cook and Ballions).<br><br>Despite being a mobile species, wrasse 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 also 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<br><br>functioning of associated communities.<br><br>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 October) allowing the fish stocks eight months in which they are not targeted by commercial fishers.<br><br>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. | (Corkwing, Goldskinny, Rock cook and Ballions).<br><br>Despite being a mobile species, wrasse 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 also 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<br><br>functioning of associated communities.<br><br>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 October) allowing the fish stocks eight months in which they are not targeted by commercial fishers.<br><br>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. |

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| | the Wrasse fishery for further assessment. | | |
| 4. Barrier to species movement | Out – Handline fishing does not put in the water any object which would cause barriers to species movement. The SAC is an open water environment connected to the wider English Channel water body and therefore there is not likely to be a significant effect on species movement. | Out – Handline fishing does not put in the water any object which would cause barriers to species movement. The SAC is an open water environment connected to the wider English Channel water body and therefore there is not likely to be a significant effect on species movement. | Out – Handline fishing does not put in the water any object which would cause barriers to species movement. The SAC is an open water environment connected to the wider English Channel water body and therefore there is not likely to be a significant effect on species movement. |
| 5. Deoxygenation | OUT – The activity will not lead to any changes in nutrient or organic loading, smothering or siltation rate changes and therefore will not cause deoxygenation. | OUT – The activity will not lead to any changes in nutrient or organic loading, smothering or siltation rate changes and therefore will not cause deoxygenation. | OUT – The activity will not lead to any changes in nutrient or organic loading, smothering or siltation rate changes and therefore will not cause deoxygenation. |
| 6. Hydrocarbon & PAH contamination | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs only within marina's mainly outside of the SAC, so any accidental spills will be minor. Furthermore, the feature is not sensitive to hydrocarbon & PAH contamination. Therefore, it is unlikely that there will be a significant effect of Hydrocarbon / PAH contamination. | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs only within marina's mainly outside of the SAC, so any accidental spills will be minor. Furthermore, the feature is not sensitive to hydrocarbon & PAH contamination. Therefore, it is unlikely that there will be a significant effect of Hydrocarbon / PAH contamination. | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs only within marina's mainly outside of the SAC, so any accidental spills will be minor. Furthermore, the feature is not sensitive to hydrocarbon & PAH contamination. Therefore, it is unlikely that there will be a significant effect of Hydrocarbon / PAH contamination. |
| 7. Introduction of light | OUT - Equipment located within the water column does not require lighting, whilst small numbers of vessels which predominantly operate in daylight hours will not produce significant amounts of additional light which could | OUT - Equipment located within the water column does not require lighting, whilst small numbers of vessels which predominantly operate in daylight hours will not produce significant amounts of additional light which could penetrate | OUT - Equipment located within the water column does not require lighting, whilst small numbers of vessels which predominantly operate in daylight hours will not produce significant amounts of additional light which could penetrate |

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| | penetrate the water column to the features. Therefore, there will not be a significant effect on light within the SAC. | the water column to the features. Therefore, there will not be a significant effect on light within the SAC. | the water column to the features. Therefore, there will not be a significant effect on light within the SAC. |
| 8. Introduction or spread of invasive non-indigenous species (INIS) | OUT – The fleet operates within the local area, so the introduction or translocation of non-indigenous species is considered unlikely. | OUT – The fleet operates within the local area, so the introduction or translocation of non-indigenous species is considered unlikely. | OUT – The fleet operates within the local area, so the introduction or translocation of non-indigenous species is considered unlikely. |
| 9. Litter | OUT – Handlines use only a very small amount of equipment which enters the water (line and hook). Fishers have the monetary incentive to retain all equipment. Hooks which cannot be removed from catch will be shed into the water column and can corrode quickly (Annex 3). Therefore, there is unlikely to be a significant effect of litter. | OUT – Handlines use only a very small amount of equipment which enters the water (line and hook). Fishers have the monetary incentive to retain all equipment. Hooks which cannot be removed from catch will be shed into the water column and can corrode quickly (Annex 3). Therefore, there is unlikely to be a significant effect of litter. | OUT – Handlines use only a very small amount of equipment which enters the water (line and hook). Fishers have the monetary incentive to retain all equipment. Hooks which cannot be removed from catch will be shed into the water column and can corrode quickly (Annex 3). Therefore, there is unlikely to be a significant effect of litter. |
| 10. Organic enrichment | OUT – The activity will not lead to any changes in nutrient or organic loading and therefore is unlikely to lead to significant effects. | OUT – The activity will not lead to any changes in nutrient or organic loading and therefore is unlikely to lead to significant effects. | OUT – The activity will not lead to any changes in nutrient or organic loading and therefore is unlikely to lead to significant effects. |
| 11. Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion | OUT – Vessels targeting wrasse and bass will drift fish and therefore will not cause penetration or disturbance to the seabed. Any penetration from other vessels using this gear type is likely to be negligible as the feature is hard substrate which cannot usually be | OUT – Vessels targeting wrasse and bass will drift fish and therefore will not cause penetration or disturbance to the seabed. Any penetration from other vessels using this gear type is likely to be negligible as the feature is hard substrate which cannot usually be | OUT – Vessels targeting wrasse and bass will drift fish and therefore will not cause penetration or disturbance to the seabed. Any penetration from other vessels using this gear type is likely to be negligible as the feature is hard substrate which cannot usually be |

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| | penetrated. Physical abrasion is considered under pressure 1. | penetrated. Physical abrasion is considered under pressure 1. | penetrated. Physical abrasion is considered under pressure 1. |
| 12. Synthetic compound contamination (incl, pesticides, antifoulants, pharmaceuticals) | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs mostly within marina's, so any accidental spills will be minor. The feature is not sensitive to synthetic compound contamination. Therefore, it is unlikely that there will be a significant effect of synthetic compound contamination. | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs mostly within marina's, so any accidental spills will be minor. The feature is not sensitive to synthetic compound contamination. Therefore, it is unlikely that there will be a significant effect of synthetic compound contamination. | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs mostly within marina's, so any accidental spills will be minor. The feature is not sensitive to synthetic compound contamination. Therefore, it is unlikely that there will be a significant effect of synthetic compound contamination. |
| 13. Transition elements and organo-metal (e.g. TBT) contamination | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs only within marina's, so any accidental spills will be minor. The activity does not introduce any contamination into the water column. Lead balls used on the lines are not lost to sea. The feature is not sensitive to synthetic compound contamination. Therefore, it is unlikely that there will be a significant effect of synthetic compound contamination. | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs only within marina's, so any accidental spills will be minor. The activity does not introduce any contamination into the water column. Lead balls used on the lines are not lost to sea. The feature is not sensitive to synthetic compound contamination. Therefore, it is unlikely that there will be a significant effect of synthetic compound contamination. | OUT – Vessels partaking in this activity are small (mostly under 10m) and refuelling vessels occurs only within marina's, so any accidental spills will be minor. The activity does not introduce any contamination into the water column. Lead balls used on the lines are not lost to sea. The feature is not sensitive to synthetic compound contamination. Therefore, it is unlikely that there will be a significant effect of synthetic compound contamination. |
| 14. Under water noise changes | OUT – The features are not sensitive to underwater noise therefore there is unlikely to be a significant effect. | OUT – The features are not sensitive to underwater noise therefore there is unlikely to be a significant effect. | OUT – The features are not sensitive to underwater noise therefore there is unlikely to be a significant effect. |
| 15. Visual disturbance | OUT – The features are not sensitive to visual disturbance, therefore there is unlikely to be a significant effect. | OUT – The features are not sensitive to visual disturbance, therefore there is unlikely to be a significant effect. | OUT – The features are not sensitive to visual disturbance, therefore there is unlikely to be a significant effect. |

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| **4. What key attributes of the site are likely to be effected by the identified pressure(s)?** | Pressure: Removal of target Species<br><br>**Attributes:**<br><br>• Structure: species composition of component communities<br>• Structure and function: presence and abundance of key structural and influential species<br>• Distribution: presence and spatial distribution of biological communities |
| **5. What conservation objectives are likely to be effected by the identified pressure(s)?** | 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).<br><br>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:<br><br>• **The extent and distribution of qualifying natural habitats and habitats of the qualifying species**<br>• **The structure and function (including typical species) of qualifying natural habitats**<br>• The structure and function of the habitats of the qualifying species<br>• **The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely**<br>• The populations of qualifying species<br>• The distribution of qualifying species within the site |

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| | Method<br>Commercial handlining is a fishing method that uses a rod and line with hooks and bait or lures to catch pelagic fish. Bass fishers drift fish with the currents using live bait or lures. They target their activities when the tide is running in and out (not at slack tide). They target the location in the SAC known as the Race.<br><br>Commercial wrasse fishing vessels target wrasse species, predominantly Ballan wrasse (but also corkwing, rock cook, ballions and goldsinny). Fishers use bait (predominantly ragworm) and size 4 barbless hooks with a jig head lead ball to prevent injury and deep hooking (this live fishery requires that fish are in live good condition when caught). Fishing for wrasse is carried out whilst drifting with the currents (not whilst anchored). Commercial wrasse fishing vessels operate within designated area's covering only a small proportion of the SAC and mostly operate outside of the designated SAC site (Annex 1).<br><br>Effort<br>Up to 20 commercial vessels fish for bass mainly between April and October within the SAC when permitted by European legislation.<br><br>Up to 10 commercial wrasse fishing vessels fish using handlines within the SAC. Operating between the months of July to October when weather naturally restricts fishing.<br><br>Monitoring<br>In 2018 commercial wrasse fishers have been required to submit catch return forms (Annex 2). These forms require the fishers to detail the location of fishing, the number of rods used, hours fished for and amount of individual wrasse species landed. Furthermore, compliance patrols carried out by officers monitor commercial handline fishing activity locations, effort, compliance with National and European regulations and the Wrasse Fishery Guidance.<br><br>Additional Monitoring activities are described in **Studland to Portland SAC – Monitoring & Control Plan – Wrasse Fishing.**<br><br>**Generic Impacts** |
| **6. Potential scale of pressures and mechanisms of effect/impact (if known)** | The main pathways through which the activity has the potential to affect designated features is 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/key species in a biotope. Removal of fish species can have significant impacts on the structure and functioning of benthic communities. |

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| | The implications of removing wrasse, between a particular size range (see Wrasse Fishery Guidance for species-specific slot sizes), is largely unknown and the majority of scientific literature is focused on the impacts to the wrasse populations, which will differ depending on the reproductive and life-history strategies employed by each species. Potential impacts may be inferred through information relating to their ecology, biology and role within the ecosystem.<br><br>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. piscovorous 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). 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 have 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. Wrasse also serve as a prey species for gadoids, sea birds and mammals (seals and otters) (Steven 1933; Nedreaas *et al*. 2008; Helfman *et al*., 2009; Smale, 2013). At low abundances of piscivores, the distribution of coastal meopredatory 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.<br><br>There is relatively 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). A number of 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 |

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| | cleaning behaviour on the Swedish coast (Hillden, 1983), Lough Hyne, Ireland (Hutcherson, 1990) and Black Sea (Darkov & Mochek, 1980). 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).<br><br>The other pelagic fisheries are principally managed through a minimum size dictated by European legislation and or quota's and other regulatory instruments. The minimum size for Bass is currently 42cm, pollack 30cm, plaice 27cm and cod 35cm. Bream is managed through a byelaw of a minimum size at 23 cm. The fishery is also subject to a restriction to under 12 m vessels size the 'Vessels used in fishing' Byelaw. This in turn limits the number rods and crew the fishers can use.<br><br>Throughout the season IFC officers patrol the SAC for compliance with the species regulatory measures. In general compliance with these measures is good.<br><br>Based on the current potential for the removal of wrasse to lead to a significant effect on the designated features of the SAC via the pressure removal of target species an Appropriate assessment should be carried out. | |
| **7. Is the potential scale or magnitude of any effect likely to be significant?** | **Alone**<br><br>**Yes** | **In-Combination**<br><br>**To be carried out in AA** |
| **8. Have NE been consulted on this LSE? If yes, what was NE's advice?** | See Natural England response letter received 29/03/2019<br><br>See Natural England response letter received 21/06/2019 – "In its current form, Natural England agrees with SIFCA's approach to the tSLE and the decision to conclude that the removal of target species is the only pressure presenting a level of risk where likely significant effect upon the sub-features of the SAC reef habitat could not be ruled out." | |

# 6 Appropriate Assessment

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

A map of wrasse fishing location within the site can be found in Annex 3. This map shows where fishing activity occurs in relation to the designated site boundary. Due to the low definition of the data (general area's not specific co-ordinates) available the maps do not fully illustrate the exact areas which are fished most often. Predominantly wrasse handline activity is seen off of Portland Bill, and outside of the SAC at Ringsted. The total area fished represents 1.72% of the total SAC area. Of the infralittoral rock feature, 9.9 % of the features area is fished.

## 6.2 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 a number of 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 wrasse 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.

### 6.2.1 Biological disturbance

*6.2.2.1 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 10 and 30 cm in length. The mesh size used in salmon farms means that wrasse less than 10 cm (total length) are not retained and as a consequence restricts the capture of wrasse to 10 cm or greater (Treasurer, 1996; Varian *et al*., 1996; Sayer *et al*., 1996a).

*6.2.2.2.1 Population effects*

The life history characteristics and reproductive strategies employed by each wrasse species is different (Table 3). 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 3.** 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**<br>*Labrus bergylta* | **Corkwing wrasse**<br>*Symphodus melops* | **Goldsinny wrasse**<br>*Ctenolabrus rupestris* | **Cuckoo wrasse**<br>*Labrus mixtus* | **Rock cook wrasse**<br>*Centrolabrus exoletus* |
|---|---|---|---|---|---|
| Maximum age | 29 years – Male<br>25 years – Female<br>(Dipper *et al*. 1977) | 9 years – Male (Darwall *et al*. 1992) | 14 years – Male<br>20 years – Female<br>(Sayer *et al*. 1995) | 20 years (Muus & Nielsen, 1999) | 8 years – Male<br>9 years – Female<br>(Darwall *et al*. 1992; Treasurer, 1994) |

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| | | 7+ years – Female (Sayer *et al*. 1996a) | | | |
| 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<br>6-9 years -Male<br>(Darwall *et al*. 1992) | 2-3 years – Female<br>(Darwall *et al*. 1992)<br>1-3 year – Male<br>(Uglem *et al*. 2000; Matland, 2015*) | 2-3 years – Female<br>(Darwall *et al*. 1992)<br>3 years – Male<br>(Matland, 2015*) | 2 years – Female<br>6-9 years – Male<br>(Darwall *et al*. 1992) | 2 years – Female<br>(Darwall *et al*. 1992; Matland, 2015*)<br>2 years – Male<br>(Matland 2015*) |
| Size at maturity | 16-18 cm – Female<br>28 cm – Male<br>(Darwall *et al*. 1992) | 7-10 cm<br>(Fishbase; Darwall *et al*. 1992)<br><br>9 cm – Female<br>14 cm – Male<br>(Matland, 2015*) | 9.5 cm (Darwall *et al*. 1992)<br><br>8 cm – Females<br>9 cm – Males<br>(Matland, 2015*) | 16 cm – Female<br>24 cm – Male<br>(Darwall *et al*. 1992) | 9 cm – Males<br>8.5 cm – Females<br>(Matland, 2015*) |
| Spawning period (Atlantic) | April – August<br>(Darwall *et al*. 1992) | April – September<br>(Darwall *et al*. 1992) | April – September<br>(Darwall *et al*. 1992) | May – July<br>(Darwall *et al*. 1992) | May – August<br>(Darwall *et al*. 1992) |
| Reproductive strategy | Hermaphrodite<br>(Darwall *et al*. 1992) | Gonochoristic<br>(Darwall *et al*. 1992) | Gonochoristic<br>(Darwall *et al*. 1992) | Hermaphrodite<br>(Darwall *et al*. 1992) | Gonochoristic<br>(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 largely driven by social cues (Leclercq *et al*. 2014) and also 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 4) (Villegas-Ríos *et al*. 2013a), with current literature indicating sex change generally occurs 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 4.** 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 4), the majority of 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 generally 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 the vast majority 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 different 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, goldwinny wrasse are a gonochoristic species and have 'accessory' males who mimic females and perform sneak spawning (observed in two thirds of spawnings) (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 have a tendency 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 hermphrodites (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 similar to 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 likely 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. Similar to 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 gonochrositic species, particularly corkwing, means the fishery will lead to the removal of larger males. The hermphroditic 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, Corckwing, Rockcook 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 number of 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 the majority 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 high level of 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.

*6.2.2.2.2 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).

In order to identify possible wider ecosystem effects their 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. piscovorous 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 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 (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 very 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 number of studies have examined the relationship between wrasse predation on epifaunal invertebrate grazers of brown macro algae found in rocky areas 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 as a result 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; Nedreaas *et al*. 2008; Helfman *et al*., 2009; Smale, 2013). At low abundances of piscivores, the distribution of coastal meopredatory 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.

*6.2.2.2.3 Cleaning behaviour*

There is relatively 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). A number of 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 goldwinny 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 as a way to control ectoparasites (Henriques & Almada, 1997). Introductory experiments in tanks and aquaria found that goldsinny, rock cook and female cuckoo wrasse 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 (Bjordal, 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.

*6.2.2.2.4 Evidence of cleaning behaviour in tropical ecosystems*

In tropical systems, parasitic sea lice have been shown to have a number of 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*, as a result 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 thicklip 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 as a result 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 as a result of cleaner fish therefore indicates those with no access to cleaning organisms may be less fit.

## 6.3 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 expert advice and activities data, rather than scientific data. A table below summarises the condition of each sub-feature.

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

**Table 8.** A summary of the feature condition of the Studland to Portland SAC as per the Natural England Condition Assessment 2018.

## 6.4 Existing Management Measures

- **Bottom Towed Fishing Gear Byelaw** – prohibits bottom towed fishing gear over sensitive reef features within both the Studland Bay to Ringstead Bay reefs and the Portland reefs, in the Studland to Portland SAC.

- **Vessel Used in Fishing Byelaw –** prohibits commercial fishing vessels over 12 metres from the Southern IFCA 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.

- Alongside Cornwall and Devon and Severn IFCA, Southern IFCA developed a 7-point **'Wrasse Fishery Guidance'** plan in June 2017 which involves a number of voluntary measures[11]. The plan includes:

  - A range of species-specific maximum and minimum sizes have been developed in order to maintain recruitment into the fishery through aligning minimum sizes above the size of sexual maturity. The maximum size will serve to maintain a balanced population structure through protecting the larger established family groups from capture. Maximum sizes are particularly effective at protecting the longer-lived and larger growing wrasse species which employ a hermaphrodite reproductive strategy.
    - Ballan wrasse: 18 to 28cm
    - Corkwing wrasse: 14 to 22cm
    - Rockcook wrasse: 12 to 18cm
    - Goldsinny wrasse: 12 to 18cm
    - Cuckoo wrasse: to be returned to the fishery immediately

  - No take zones are believed to afford effective and long-term protection for species with high site fidelity and small home ranges/territories, like those exhibited by local wrasse species (Morel *et al*., 2013). A series of no take zones and a no potting zone have been developed within the Southern IFCA district, in many cases overlapping with the boundaries of Marine Protected Areas. Approximately 60% of fishable areas (i.e. those less than 10 metres depth) are no take zones. In addition, popular sites for recreational sea fishing have been included as no take zones in order to reduce conflict between users and to ease the pressure on wrasse populations in these areas.

  - Fishing depth restrictions (>10 m) to protect the survivability of catches. Approximately 90% of the SAC is deeper than 10 metres. Survivability of wrasse species is negatively correlated with the depth from which they are fished. Individuals brought up over 10 metres water depth are visually affected by the change in pressure and take longer to recover.

  - Effort restriction through a pot limitation of 80 traps per vessel. A limit of 80 traps represents both a proportionate limit for the small inshore fishing vessels (8 metres or less in length) involved in the fishery and a level of gear intensity which is high unlikely to lead to any significant interaction with the seabed through abrasion (supported by the results of potting impact studies).

  - A fishing closed season from 1st April to 30th June (inclusive) has also been introduced to protect wrasse populations during their peak spawning period.

  - Monthly fishermen catch returns detailing the quantities of species caught, fishing location and fishing effort. This provides valuable information to better understand the exploitation of the fishery.

  - 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.

[11] https://secure.toolkitfiles.co.uk/clients/25364/sitedata/files/Wrasse-Guidance.pdf

The Fishery Guidance aims to protect the long-term sustainability of wrasse populations within the Southern IFCA 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 fishermen and with the scientific literature in mind. In line with byelaw making guidance, Southern IFCA encourages an ‘industry-led’ approach for the management of the wrasse fishery in order to secure long-term sustainability. Southern IFCA have discussed the fishery guidance plan with local fishermen and salmon farm representatives. Should the approach prove ineffective or significant changes occur within the fishery, Southern IFCA will introduce regulatory measures to address the issue of wrasse fishery management.

In 2017 inspections of wrasse being landed or retained revealed 77% compliance with the Wrasse Fishery Guidance measures. In 2018 these inspections found 100% compliance with the Wrasse Fishery Guidance Measures.

## 6.5 Monitoring

A number of monitoring activities will accompany the 7-point ‘Wrasse Fishery guidance’ plan and help to assess its short and long-term success. These are described in detail within the **Studland to Portland SAC – Monitoring & Control Plan – Wrasse Fishing.** A summary of the monitoring and control plan can be found below:

In 2017, the collection of ‘Catch return forms’ from fishers has enabled Southern IFCA to understand the baseline effort, scale and location of the fishery post the implementation for the Wrasse Fishery Guidance measures. This data will be required from the fishers every year going forward.

For the Handline fishery, after two consecutive years of data collection, Southern IFCA will be able to closely monitor any change in fishing effort, extent, landings and landings per unit effort of the fishery. These variables will be compared between years to determine if fishing intensity has significantly (25%) changed. This would cause a trigger for assessment where by the fishery would undergo the tSLE and HRA process once again working with Natural England as the government’s statutory nature conservation body. If the HRA determined there would be an adverse effect on site integrity Southern IFCA would peruse appropriate new/changes to the current management measures.

The fishery is also monitored in real-time by IFC Officers through compliance patrols aboard Fisheries Patrol Vessels and on land at harbour and ports. If repeated non-compliance of the Wrasse Fishery Guidance measures was found a trigger for further assessment would occur. This would follow the same process as above.

Before and after each fishing season Southern IFCA works with the buyers and sellers to obtain predicted total required fish numbers, and then after the season the total number of fishes bought. This further enables Southern IFCA to monitor the scale of the fishery. If significant (25%) changes in demand are seen this would cause a trigger for assessment which would follow the same process as above.

In collaboration with a range of partners including Natural England and industry operators, Southern IFCA has commenced a programme of study to improve our understanding of the fishery and its effects on the marine environment. Research techniques include the collection of fisheries catch data mentioned above, catch sampling and the development of a PhD.

Catch sampling involves Southern IFCA officer going onboard wrasse fishing vessels on an ad hoc basis, recording and measuring the catch of each pot/ handlines (including target wrasse and bycatch species). The data collected will provide valuable information on the level of exploitation of the fishery, population structure of the catchable population and the selectivity of gear type used. Improved monthly catch return forms for 2019 will allow for the differentiation of effort and level of removal between areas, and fishing type, including within and outside of the SAC. The fishery catch data and catch sampling data for potting collected in 2017, alongside landings data from buyers, was analysed as part of one of Southern IFCAs 2017 internship programme projects; 'Wrasse Fishery Assessment'. This involved calculating catch per unit effort from catch return data and undertaking size length frequency analysis from catch sampling data. The internship also involved a literature search on wrasse biology. The report from this internship is presented in annex 7. Data from the handline fishery collected in 2018 has been analysed and a heat map of number of hours fished in the specified areas within and outside of the SAC are shown in Annex 3.

Going forward, catch sampling will be undertaken as part of a three-year research project run by the University of Exeter, in collaboration with Natural England and Southern IFCA. The project aims to investigate the functional role of wrasse within the inshore reef systems on the south west coast of England. The project will focus on assessing their role as cleaner fish species and mesopredators within the food web, looking at their behavioural and feeding ecology. It will aim to quantify the importance of the role wrasse play on reefs and therefore what the impacts of their removal will be on these habitats. In addition, the project will aim to develop a broad scale view of the population structure of wrasse in the region and improve our knowledge on elements of their general ecology such as sex ratios, and spawning seasons. The results from this project will be made available to the three south-west IFCAs in order to better inform their management, in addition to being used by Natural England in their conservation advice packages, where applicable.

Information gathered through these monitoring activities and regular compliance patrols, as well as work undertaken by other organisations, including Cefas, will allow Southern IFCA to closely monitor the fishery, particularly fishing effort and landings. This information will be reviewed when appropriate i.e. at the end of the fishing season or when new evidence becomes available. The review of information from monitoring activities will form part of a feedback process to identify if there is a need for assessment, and depending on the outcome, initiate a review of management. This feedback process will be outlined in a standalone Monitoring and Control Plan and provides a framework for adaptive management.

## 6.6 Table 8: Summary of Impacts

The potential pressures, associated impacts, level of exposure and mitigation measures are summarised in table 8. Only relevant attributes identified through the TLSE process have been considered here.

| Feature | Sub feature(s)/ Supporting habitat(s) | Attribute | Target | Potential Pressure(s) and Associated Impacts | Nature and Likelihood of Impacts | Mitigation measures[12] |
|---|---|---|---|---|---|---|
| Reef | Circalittoral and Infralittoral rock | Structure: species composition of component communities | Maintain the species composition of component communities. | The selective extraction of the target species has the potential to lead to a change in the biomass of listed biotope representative and/notable species. Principally brown algal species; *Laminaria hyperborea*, *Saccorhiza polyschides* and *Zanardinia typus*.<br><br>The removal of wrasse, as an epibenthic grazer, may have indirect effects on algal biomass due to a 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). | Circalittoral reef lies at a depth of >10m. Due to the requirement that wrasse survive the catch, handling and transportation process for use of their cleaning behaviour in salmon farms fishing is unlikely to occur in this habitat.<br><br>In 2018, 9 licenced vessels fish for wrasse regularly, with a further 4 fishing only occasionally, all less than 8 metres in length. Of these vessels 11 used handlines. In 2019, due to one buyer dropping out of the Southern IFCA fishery, it is anticipated that up to 9 vessels will fish for wrasse with 7 of those using handlines. Vessels are active only outside of the closed season from July to October thereby providing wrasse eight months a year in which they are not commercially targeted. Not all vessels fish within the Studland to Portland SAC see Annex 3 for areas fished heat map. | **Vessel Used in Fishing byelaw** prohibits commercial fishing vessels over 12 metres from the Southern IFCA district. The reduction in vessel size also restricts the level of traps that can be worked.<br><br>Southern IFCA has provided **'Wrasse Fishery Guidance'** to the industry which has been supported by both the fishers as well as the salmon farm buyers. The Guidance stipulates the following fishery procedures which are monitored by IFCO officers when out on patrol or carrying out catch inspections:<br><br>**Minimum and maximum conservation reference sizes**<br>Ballan wrasse: 18 to 28cm<br>Corkwing wrasse: 14 to 22cm<br>Rockcook wrasse: 12 to 18cm<br>Goldsinny wrasse: 12 to 18 cm |

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

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| | | | | | Currently, ballan wrasse are the predominant target species of the fishery with more than six vessels targeting Ballan wrasse only. If other wrasse species are caught by these vessels' other species, no matter the size of the fish, are returned to the sea. Other vessels target four wrasse species (Corkwing, Goldsinny, Rock Cook and Ballan). Therefore, the removal of the other four wrasse species (other than ballan wrasse) is likely to be less. 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 functional roles as mid-trophic level demersal and benthic species consisting predominantly of invertebrates. As such, the less targeted wrasse species may continue to exert some form of top-down control on epifaunal growth and grazing.<br><br>Fishing for wrasse is limited to less than 10 metres depth and is only conducted throughout 1.72 % of the site, over 9.9 % of infralittoral rock habitat leaving a large area in which wrasse are not taken or disturbed.<br>This leaves a significant proportion of the MPA not subject to fishing which are likely to act a refuge areas | Cuckoo wrasse: to be returned to the fishery immediately<br><br>**No take zones** – six no take zones are described as well as a 'no potting' zone between Portland Bill and Chesil Cove.<br><br>**Maximum fishing depth –** fishing for wrasse should not take place in water deeper than 10 meters.<br><br>**Closed Season** – 1st April to 30th June each year<br><br>**Pot Effort Limitation** – no more than 80 baited wrasse pots per vessel<br><br>**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<br><br>**Biosecurity and husbandry –** appropriate measures should be followed<br><br>**IFC Officers Compliance Patrols -** In 2018 these inspections found 100% compliance with the Wrasse Fishery Guidance Measures. The fishery will continue to be monitored by patrols afloat and in ports/harbours.<br><br>**Wrasse Fishery Monitoring and Control Plan –** This document |

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| | | | | | and a potential source of replenishment for fished areas.<br><br>Whilst existing literature is helpful in indicating the potential for overgrazing in the absence of/ reduction in wrasse species, no such studies have been conducted in the UK. This means there is difficulty in determining the potential severity of such potential impacts as existing literature is based on different species and therefore warrants further investigation.<br><br>Southern IFCA has applied precaution in developing and implementing the most restrictive set of wrasse fishery measures through its Fishery Guidance measures. | sets out how Southern IFCA and partner organisations are conducting annual and long-term monitoring of the fishery (Summarised in Section 6.5). This monitoring will enable Southern IFCA to react to significant changes to the fishery effort and extent, compliance with the guidance, condition of the site as a result of fishing activity and new evidence relating to the impacts of the fishery. The plan sets out the feedback process to ensure that any changes are assessed and where they are deemed to lead to and adverse effect on the site's integrity that new/changes to the management are put in place. |
| Reef | Subtidal stony reef | Structure: species composition of component communities | Maintain the species composition of component communities. | Biotopes identified for stony reef are all circalittoral, so therefore are unlikely to be subject to fishing for wrasse as this is limited to <10m.<br><br>Otherwise addressed under circalittoral and infralittoral reef. | Biotopes identified for stony reef are all circalittoral, so therefore are unlikely to be subject to fishing for wrasse as this is limited to <10m.<br><br>Otherwise addressed under circalittoral and infralittoral reef. | Addressed under circalittoral and infralittoral reef. |
| Reef | Circalittoral and Infralittoral rock | Structure and function: presence and abundance of key structural and influential species | [Maintain OR Recover OR Restore] the abundance of listed species*, to enable each of them to be | The selective extraction of species was identified as a potential pressure.<br><br>Four wrasse species are targeted by the fishery. Ballan wrasse form predominant target species of the fishery, solely targeted by more than 6 of the 9 regular fishers and 5 occasional fishers. The size range of wrasse | Circalittoral reef lies at a depth of >10m. Due to the requirement that wrasse survive the catch, handling and transportation process for use of their cleaning behaviour in salmon farms fishing is unlikely to occur in this habitat.<br><br>In addition, it is unlikely that any of the representative or notable species listed will be indirectly or | Addressed under circalittoral and infralittoral reef above. |

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| | | | a viable component of the habitat. | targeted by the fishery ranges from 12 to 28 cm for Ballan wrasse, 14 to 22cm for corkwing wrasse, 12 to 18 for Rock cook and Goldsinny wrasse. Such removal impacts directly on wrasse populations through size-selective harvesting (Halvorsen, 2016) and on the wider ecosystem due to the central position wrasse hold within the food web as a mesopredatory fish (Bergström *et al*., 2016).<br><br>Studies have highlighted concerns surrounding the direct impacts size-selective harvesting may have on wrasse populations, particularly the removal of larger more fecund sexually mature adults, as well as immature individuals, depending on the species and 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; 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).<br><br>The removal of wrasse and any subsequent impacts on population structure and reproduction may have wider ranging ecosystem | directly affected by the removal of wrasse species.<br><br>In 2018, 9 licenced vessels fish for wrasse regularly, with a further 4 fishing only occasionally, all less than 8 metres in length. Of these vessels 11 used handlines. In 2019, due to one buyer dropping out of the Southern IFCA fishery, it is anticipated that up to 9 vessels will fish for wrasse with 7 of those using handlines. Vessels are active only outside of the closed season from July to October thereby providing wrasse eight months a year in which they are not commercially targeted. Not all vessels fish within the Studland to Portland SAC see Annex 3 for areas fished heat map.<br><br>Fishing for wrasse is limited to less than 10 metres depth and is only conducted throughout 1.72 % of the site, over 9.9 % of infralittoral rock habitat leaving a large area in which wrasse are not taken or disturbed. This leaves a significant proportion of the MPA not subject to fishing which are likely to act a refuge areas and a potential source of replenishment for fished areas.<br><br>The measure of this attribute is the presence and/abundance of specified rock reef species. The recently updated Studland to Portland SAC Conservation Advice mention two wrasse species under the general description of the 'Reef' | |

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| | | | | impacts. Wrasse are defined as mesopredatory fish whose diet consists primarily of invertebrates (Bergström *et al*., 2016). This functional 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).<br><br>The removal of wrasse, as an epibenthic grazer, may therefore have indirect effects on algal biomass due to a 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).<br><br>In recently updated Conservation Advice (September 2018) wrasse species (Ballan wrasse, Goldsinny wrasse) are mentioned under the general description of the 'Reef' feature when describing the diverse suite of mobile species supported by the feature. Wrasse are not however not listed within either the updated Conservation Advice or Regulation 35 Conservation Advice Packages. There are a number of | feature. However, wrasse species do not feature in the list of key species associated with the reef biotope, in either the updated Conservation Advice or Regulation 35 Conservation Advice packages. Therefore, the main concerns surrounding this attribute are related to the potential indirect impacts on algal growth related to the removal of wrasse species. The comments attached to this attribute however do specify 'the species selected should serve an important role in the structure and function of biological community'. Wrasse may be considered to fulfil these criteria based on their central role within the ecosystem. Wrasse are not protected by specific UK legislation, are not listed as a designated feature for Special Area of Conservation or Marine Conservation Zones and are not considered to be keystone species, nor characterising species of any reef community (Natural England, 2017). Advice from Natural England (2017) does however consider wrasse should be assessed in the same way as crab and lobster when undertaking this assessment.<br><br>Currently, ballan wrasse are the predominant target species of the fishery with more than six vessels targeting Ballan wrasse only. If other wrasse species are caught by these vessels' other species, no matter the size of the fish, are | |

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| | | | | representative and/notable species however which have the potential to be indirectly impacted by the removal of wrasse. Principally brown algal species; *Laminaria hyperborea*, *Saccorhiza polyschides* and *Zanardinia typus*.<br><br>The MarLIN web page for the 'Grazed *Laminaria hyperborea* park with coralline crusts on lower infralittoral rock biotope' highlights kelp (Laminaria hyperborea) biotopes are partially reliant on low or no populations of sea urchins, with dense aggregations a principal threat to these biotopes in the North Atlantic. Intense urchin grazing can lead to a shift from kelp dominated biotopes to those characterised by coralline encrusting algae, with subsequent reductions in biodiversity.<br><br>Concerns have also been raised regarding the potential reduction in cleaning behaviour associated with the removal of wrasse and subsequent impacts on the overall health of the reef system (Natural England, 2017).<br><br>In addition, it is unlikely that any of the representative or notable species listed will be indirectly or directly affected by the removal of wrasse species. | returned to the sea. Other vessels target four wrasse species (Corkwing, Goldsinny, Rock Cook and Ballan). Therefore, the removal of the other four wrasse species (other than ballan wrasse) is likely to be less. 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 functional roles as mid-trophic level demersal and benthic species consisting predominantly of invertebrates. As such, the less targeted wrasse species may continue to exert some form of top-down control on epifaunal growth and grazing.<br><br>The MarLIN web page for the 'Grazed *Laminaria hyperborea* park with coralline crusts on lower infralittoral rock biotope' highlights mechanisms that control sea urchin aggregations are poorly understood but have been attributed to top down urchin predators (cod, lobsters). Large scale urchin barrens within the North East Atlantic are limited to the North Norwegian and Russian Coast. Within the UK, urchin grazed biotopes are generally localised to a few regions in North Scotland and Ireland. They are also a listed biotope of the Studland to Portland SAC. 'Urchin barrens' are however | |

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| | | | | | not presently an issue within the UK, however relatively low urchin grazing has been found to the control the depth distribution of *L. hyperborea* which can negatively impact on recruitment of the species and reduce understory community abundance and diversity. Such issues, with respect to urchin barrens, are not highlighted as an issue within the Studland to Portland SAC Conservation Advice. The sensitivity of the biotope ‘Grazed *Laminaria hyperborea* park with coralline crusts on lower infralittoral rock’ is considered as having medium sensitivity to the removal of target and non-target species.<br><br>Literature from tropical reef systems highlight 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 their role in maintaining local reef diversity.<br><br>Whilst existing literature is helpful in indicating the potential for overgrazing in the absence of/ reduction in wrasse species and potential implications of reductions in cleaning behaviour, no such studies have been conducted in the UK. This means there is difficulty in determining the potential severity of such potential impacts as existing | |

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| | | | | | literature is based on different species and therefore warrants further investigation. | |
| Reef | Subtidal stony reef | Structure and function: presence and abundance of key structural and influential species | Maintain OR Recover OR Restore] the abundance of listed species*, to enable each of them to be a viable component of the habitat. | Biotopes identified for stony reef are all circalittoral, so therefore are unlikely to be subject to fishing for wrasse as this is limited to <10m.<br><br>In addition, it is unlikely that any of the representative or notable species listed will be indirectly or directly affected by the removal of wrasse species. | Biotopes identified for stony reef are all circalittoral, so therefore are unlikely to be subject to fishing for wrasse as this is limited to <10m.<br><br>In addition, it is unlikely that any of the representative or notable species listed will be indirectly or directly affected by the removal of wrasse species. | Addressed under circalittoral and infralittoral reef. |
| Reef | Circalittoral and Infralittoral rock | Distribution: presence and spatial distribution of biological communities | Maintain the presence and spatial distribution of reef communities according to the map. | Circalittoral reef lies at a depth of >10m. Due to the requirement that wrasse survive the catch, handling and transportation process for use of their cleaning behaviour in salmon farms fishing is unlikely to occur in this habitat.<br><br>Otherwise addressed under Structure: species composition of component communities. | Circalittoral reef lies at a depth of >10m. Due to the requirement that wrasse survive the catch, handling and transportation process for use of their cleaning behaviour in salmon farms fishing is unlikely to occur in this habitat.<br><br>Otherwise addressed under Structure: species composition of component communities. | Otherwise addressed under Structure: species composition of component communities. |
| Reef | Subtidal stony reef | Distribution: presence and spatial distribution of biological communities | Maintain the presence and spatial distribution of reef communities according to the map. | Biotopes identified for stony reef are all circalittoral, so therefore are unlikely to be subject to fishing for wrasse as this is limited to <10m.<br><br>Otherwise addressed under Structure: species composition of component communities. | Biotopes identified for stony reef are all circalittoral, so therefore are unlikely to be subject to fishing for wrasse as this is limited to <10m.<br><br>Otherwise addressed under Structure: species composition of component communities. | Otherwise addressed under Structure: species composition of component communities. |

# 7 Conclusion[13]

In order to conclude whether fishing for wrasse using 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). 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) (see table 8), also identified through the TLSE process.

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 is size-selective and therefore leads to the removal of certain groups from the population. For ballan wrasse, the key target species, the preferred size (**prior to the introduction of the wrasse fishery guidance**) at which individuals were targeted could lead to the removal of both immature and larger mature females. For the smaller gonochoristic species (corkwing, goldsinny and rock cook), mature individuals, particularly males were particularly vulnerable to removal. There was therefore the potential for size- and thus sex-selective harvesting to take place in all four species which has a variety of implications related to population dynamics, demography and reproduction (Halvorsen, 2016). Following the introduction of the minimum and maximum sizes, as part of the wrasse fishery guidance, these impacts will be eliminated or reduced. The measures are designed to allow individuals to reproduce at least once before being removed from the fishery by aligning minimum sizes with sexual maturity and to protect wrasse species with complex reproductive strategies. Despite this, there is still the potential for size- and thus sex-selective harvesting to take place. 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 recently updated Conservation Advice (September 2017), wrasse species do not appear within any species list within the updated Conservation Advice or Regulation 35 Conservation Advice packages. Nor does wrasse appear as any designated feature of either a Special Area of Conservation or Marine Conservation Zone (Natural England, 2017). Therefore, these direct impacts on wrasse populations, whilst important for the long-term sustainability of the fishery, 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 species and subsequent wider ecosystem impacts resulting from the removal of wrasse species. 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 wider ranging impacts on the ecosystem. Research highlighted concerns surrounding the removal of wrasse as an epibenthic grazer, due to the potential for indirect effects on algal biomass as a result of reduced top-down control on epifaunal growth and subsequent overgrazing (Bergström *et al*., 2016). Studies based on reef systems in other temperate locations reported

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

positive indirect effects of wrasse species on macroalgae, with significant increases in algal biomass in the presence of fish predators (Perez-Matus & Shima, 2010; Newcombe & Taylor, 2010). These indirect impacts have the potential to affect a number of notable and representative brown algal species; *Laminaria hyperborea*, *Saccorhiza polyschides* and *Zanardinia typus*.

In 2016/17 the wrasse fishery took place seasonally from April/May to October, however in 2018 the start of the season commenced from July with the introduction of the new wrasse fishery guidance. At the beginning of 2017 season 3 out of 8 vessels engaged in the handline fishery in the area surrounding the Studland to Portland SAC, although all vessels are not believed to fish within the SAC. In 2018, 9 vessels regularly took part in the handline fishery, with an additional four only occasionally fishing for wrasse. Due to one buyer dropping out, it is anticipated that up to 9 vessels will engage in the wrasse fishery in 2019, with 7 of those using handlines. Fishing for wrasse is limited to less than 10 metres in depth to reduce the likelihood of barotrauma effects on the fish caught and is not conducted throughout the entire site, thus only covering a small area (equating to 1.72 % of the total SAC area, and 9.9 % of the infralittoral rock feature). This leaves a significant portion of the MPA and targeted habitat to act as refuge areas and potential source of replenishment for fished areas. Currently, the dominant species targeted is ballan wrasse, *Labrus bergylta* (solely targeted by 6 out of 9 vessels in 2018). If other species of wrasse are caught by these vessels they are returned and, as they are considered to belong to the 'coastal mesopredatory fish' functional group and thus to some extent may perform similar functional roles, are likely to continue to exert some form of top-down control on epifaunal growth and grazing.

It is Southern IFCAs duty as the competent and relevant authority to manage damaging activities that may affect site integrity and lead to deterioration of the site. The Based on the mitigation measures acted upon the wrasse handline fishery, which include; The Wrasse Fishery Guidance and the wrasse fishery Monitoring and Control Plan, as well as other IFCA byelaws it is unlikely that indirect effects of removal of wrasse species will occur at levels significant enough to have an adverse effect on site integrity and therefore will not hinder the sites conservation objectives.

The wrasse fishery guidance, introduced in June 2017, outlines a wide range of different measures and as such means the fishery is subject to the greatest number of restrictions in the Southern IFCA district. The guidance is aimed at ensuring the long-term sustainability of the fishery and as such will directly benefit wrasse populations by preventing over-exploitation, through a number of measures, particularly minimum and maximum sizes, no take zones, closed season and depth restrictions. Patrols and inspections conducted by Southern IFCA Officers in 2018, reported 100 % compliance with the Wrasse fishery minimum and maximum sizes guidance measures. Fisher compliance with these measures is also self-regulated by the buyers of wrasse who rely on healthy, correctly sized individuals to most effectively perform their role within the salmon farms. In the coming year Southern IFCA will continue to monitor compliance with the Wrasse fishery guidance. By protecting wrasse populations from over-exploitation this will, in turn, lead to indirect wider ecosystem benefits. In particular, the fishery guidance will help to safeguard against the potential impacts related to the ecological function (i.e. cleaning behaviour, role as epibenthic grazer) and wider ecosystem (i.e. overall reef health). As such, it significantly reduces potential risks associated with uncertainties surrounding these effects on ecological function.

The fishery is underpinned by a Monitoring and Control Plan. This plan describes how the fishery is monitored and how set trigger point changes would lead to the re-assessment of the fishery. This is done through the collection of catch return forms from fishers, submission of annual wrasse buyers' and sellers' numbers and the 3-year research project being undertaken. If this data or external new research revealed that a change in the fishery would lead to an adverse effect on the site, changes to or additional management would be put in place. The plan therefore provides a frame work for adaptive management.

Therefore, when the effort, scale and location of the activity is assessed in conjunction with the mitigation measures including the Wrasse Fishery Guidance and other IFCA byelaws, as well as the application of a detailed Monitoring and Control plan in place to ensure changes to the fishery can be reacted to, it is concluded that this handline fishing for wrasse will not lead to an adverse effect on the Studland to Portland SAC's site integrity.

# 8 In-combination assessment

No adverse effect on the reef feature/sub-features of Studland to Portland SAC was concluded for the effect of fishing for wrasse using handlines alone within the SAC. This activity currently occurs in the Studland to Portland SAC alongside other fishing activities and therefore requires an in-combination assessment.

No commercial plans and projects were found to occur within or to potentially affect the Studland to Portland SAC.

There is the potential for wrasse handline activity to have a likely significant effect when considered in-combination with other fishing activities that occur within the site. These are outlined in section 8.1. 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). In the Studland to Portland SAC, commercially licensed fishing vessels are known to utilise a number of different gear types and are engaged in multiple fishing activities (i.e. potting, netting and longlining) and this, whilst dividing effort between gear types, may lead to cumulative impacts different to those of a single fishing activity.

## 8.1 Other fishing activities

| Fishing activity | Potential for in-combination effect |
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| Potting (crab/ lobster/ whelk/ wrasse/cuttle fish) | Handline activity for wrasse has undergone an HRA process in which one pressure was screened in: the removal of target species.<br><br>Potting for crab, lobster, cuttlefish and whelk targets different species and therefore is not likely to lead to an in-combination effect.<br><br>Potting for wrasse has also undergone a HRA process in which two pressures were screened in at a tSLE stage; Abrasion/disturbance of the substrate on the surface of the seabed and removal of target species. Handline activity does not lead to Abrasion/disturbance of the substrate on the surface of the seabed and therefore there cannot be an in-combination effect of this impact.<br><br>A fishery for live wrasse developed in 2015/2016, where fish traps were predominantly used to target live wrasse species. Since 2017 there has been a shift in fishing practice from the use of fish traps to handline fishing for live wrasse, particularly for Ballan wrasse, in response to the introduction and adoption of Southern IFCA's wrasse fishery guidance measures. This shift does not represent an increase in fishing effort or the number of participants. The same vessels are operating within the two fishery gear types, moving between gear types depending on the time of year and target species.<br><br>Fishing for wrasse within the SAC (both potting and handlines) follows the Wrasse Fishery Guidelines which limits the total number of wrasses being removed from the fishery by stipulating a maximum fishing depth, maximum and minimum conservation reference sizes, a closed season, no take zones and a no potting zone. These measures therefore indirectly protect the ecology of the SAC. The main species targeted is Ballan wrasse, with other wrasse species targeted at lower levels. Wrasse are only being removed from a 1.72 % of the 33191.09 ha SAC and 9.9 % of the infralittoral reef feature. Fishers show good levels of compliance (100% in 2018) with the wrasse fishery guidance measures.<br><br>Wrasse fishery guidance also stipulates a maximum pot limit of 80 pots per vessel. This is a figure which aligns the pot limitation with the capacity of participating vessels and ensures the fishery continues to be economically viable for these smaller fishing vessels, whilst safeguarding against the participation of any larger higher impact vessels. The density of |

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| | pots, based on a pot limitation of 80 traps used by a maximum of 8 vessels operating within the fishery and within the area known to be fished, has been calculated at approximately 26 pots set per km$^2$. This corresponds to a 'very low' to 'low' fishing gear intensity (Annex 3). Results from potting impact studies (i.e. Eno *et al*., 2001; Shester & Micheli, 2011; Coleman *et al*., 2013; Young *et al*., 2013; Haynes *et al*., 2014; Stephenson *et al*., 2015; 2016; Gall, 2016; Rees *et al*., 2016) infer the impacts of potting on temperate rocky habitats are negligible or limited in extent, particularly at such low densities.<br><br>The fishing methods used are low impact (potting and barbless hook handlines) and restricted to 10m depth or less. According to literature (see handlines tSLE and Potting HRA) very low injury levels are likely to occur in those fish which are returned to the sea and therefore they will have a high likelihood of survivability. In 2018 there was 100% compliance with the wrasse fishery guidance measures. Additionally, the fishery has a detailed monitoring and control plan in place to ensure changes in the fishery do not lead to unsustainability.<br><br>In conclusion, there are unlikely to be any in-combination effects of handline activity with wrasse potting due to the fact that the same vessels are moving between gear types, the low impact of the gear used, good compliance with the Wrasse fishery guidance measures, limited spatial overlap with the features due to closed areas, a closed season and short operating season and the implementation of a detailed monitoring. For other potting species there is no overlap between target species. |
| Demersal netting/ longlining | Netting and longlining activities do not target wrasse. As such there is unlikely to be any in-combination effects with demersal netting and longlining. |
| Pelagic longlining | Longlining only occurs on the fringes of the site and therefore potential for spatial overlap is limited. Furthermore, the two activities target different species and therefore there are no in-combination effects with respect to the selective extraction of species. |
| Commercial diving | Commercial diving may overlap spatially with handlining activity over reef features but does not target the same species. Therefore, there are unlikely to be any in-combination effects with commercial diving. |
| Recreational Angling | Recreational anglers' fish along the shore of the Studland to Portland SAC. The intensity of the activity is not well understood as there is no established form of evidence gathering on either effort or impact of the angling fisheries across the whole of the UK. However, wrasse are known to be an important species for the angling sector and due to the location in which this sector fishes they could be regularly catching wrasse species.<br>The species is not a traditional food source and the majority of anglers operate on a catch and release basis therefore wrasse caught will be return to the sea. The majority of wrasse caught by anglers are caught from the shore at very shallow depths, therefore the likelihood of barotrauma effects is low.<br>Unfortunately, there is no available evidence on the survivability of wrasse species after the catch and release process and this is likely to be varied depending on anglers' skills, gear sets and handling efficiency.<br><br>Therefore, due to the catch and release method used by anglers and the high level of mitigation in place on the commercial fishery (wrasse fishery guidance and monitoring and control plan) there is unlikely to be an in-combination effect between the two fisheries. |

# 9 Summary of consultation with Natural England

| Consultation | Date submitted | Response from NE | Date received |
|---|---|---|---|
| HRA Studland to Portland SAC – Handlines v 1.4 | 24/04/2019 | Telephone conversation had 20/05/19. Clarification required on effort, infralittoral rock area fished, in-combination effort, and monitoring and control plan. | 20/05/19 |
| HRA Studland to Portland SAC – Handlines v 1.8 | 03/06/2019 | "Natural England acknowledges that the current version of the HRA acts to address the concerns discussed during a telephone meeting between SIFCA and ourselves on 20/05/19. Consequentially, we consider this HRA to be robust in its assessment of the pressure associated with the removal of target species wrasse upon the SAC reef feature, and appropriate with regard to the respective mitigation measures presented.<br><br>Overall, Natural England does not disagree with SIFCA's conclusion of no adverse effect on site integrity when management measures are considered as mitigation. However, Natural England's own conclusion is based on the premise of a reported decline in fishery effort for target-species wrasse."<br><br>Natural England wish to continue working with SIFCA to better understand and monitor the fishery as it proceeds into the future. | 21/06/2019 |

# 10 Integrity test

It can be concluded that the activities in this Habitat Regulations Assessment (handlines), 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 6.5, 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 are likely to limit fishing effort and lead to an overall reduction in fishing mortality, as well as provide a feedback process to ensure any changes to the fishery are assessed or trigger changes to the management.

Additionally, Southern IFCA has begun a series of monitoring activities and is working alongside Natural England on a PhD to assess the wider impacts of the wrasse fishery and develop our understanding of the species' functional role.

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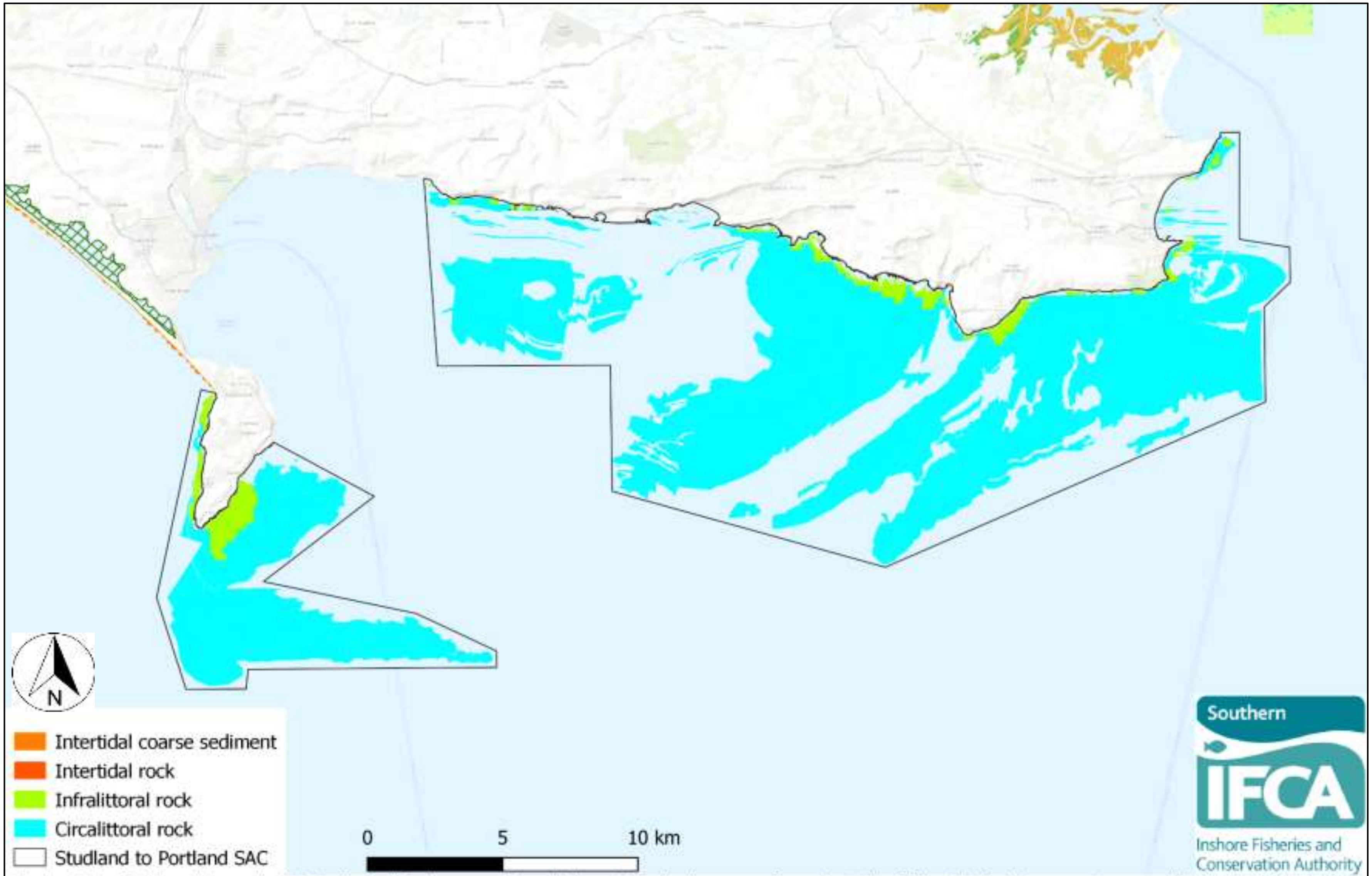
# Annex 2: Site feature/sub feature map for Studland to Portland SAC.


Intertidal coarse sediment
Intertidal rock
Infralittoral rock
Circalittoral rock
Studland to Portland SAC
N
0
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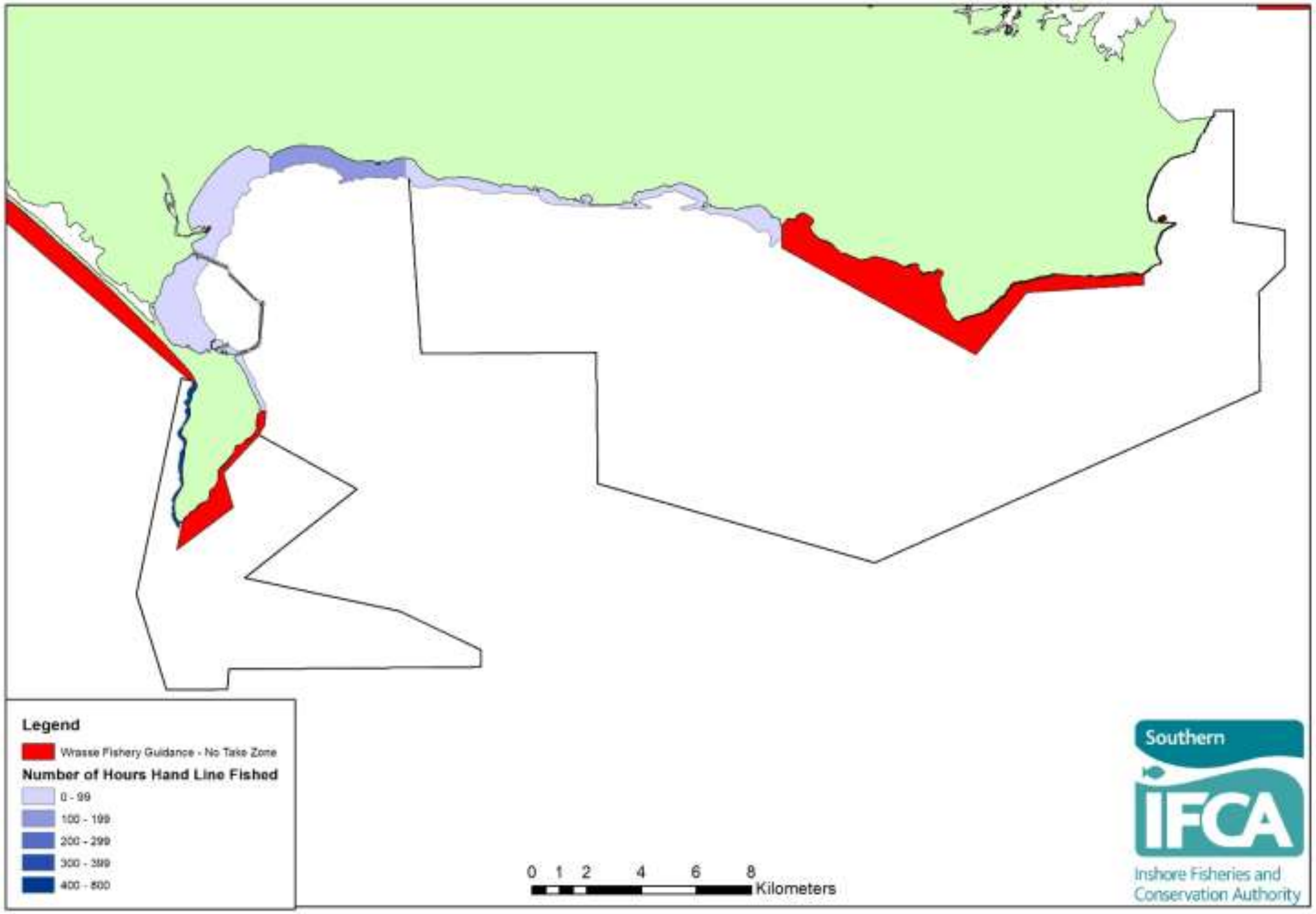
10 km
Southern
IFCA
Inshore Fisheries and Conservation Authority

# Annex 3: Fishing activity map using the known area of handline activity for wrasse (using information provided by local fishermen) in the Studland to Portland SAC.

This map has been created using data from Wrasse catch return forms received in 2018. The blue shaded areas seaward boundary mark the 10m depth contour.



# Annex 4: Natural England's advice on the management of the emerging wrasse fishery

Date: 23 February 2017
Our ref: Wrasse management support letter to IFCA

NATURAL ENGLAND

Rivers House,
Sunrise Business Park,
Higher Shaftesbury Rd,
Blandford Forum,
DT11 8ST.

Simon Pengelly
Southern Inshore Fisheries & Conservation Authority
64 Ashley Road
Parkstone
Poole
Dorset
BH14 9BN

**By email only, no hard copy to follow**

Dear Simon,

**Re: Management of emerging wrasse fishery**

Natural England's 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. Through this letter Natural England would like to offer their support to Southern IFCA's proposal to develop suitable management measures in collaboration with the Cornwall, and Devon and Severn IFCAs, for an emerging wrasse fishery observed to occur across the three IFCA districts on the south-west coast of England.

Within the Dorset portion of the Southern IFCA district Natural England has become aware of the development of a fishery targeting wrasse species (principally Ballan wrasse - *Labrus bergylta*, Rock cook - *Centrolabrus exoletus*, Corkwing wrasse - *Symphodus melops*, Goldsinny wrasse - *Ctenolabrus rupestris*). During the course of the 2016 fishing season (April – November) an increase in fishing intensity has been observed, both anecdotally by local stakeholders and also by Southern IFCA.

The emergence of this wrasse fishery has been attributed to an increased demand for cleaner fish species by the Scottish salmon producers, as an environmentally-friendly alternative to anti-parasitic chemical salmon treatments. With the continued growth of the salmon farming industry and the high infection rates of salmon observed within sea pens, the demand for wrasse is likely to increase.

The intrinsic value of wrasse, in particular to the ecology of inshore reefs has been highlighted by the important ecosystem function they play as a cleaner species. Cleaner fish are widely recognised as an integral part of maintaining the overall health of reef systems through the removal of parasites and by cleaning damaged tissue from fish and other marine organisms. The removal of significant numbers of wrasse could have unwanted negative impacts on animals that require cleaning, and therefore the overall health of the reef. The position wrasse occupy within the food web as both predators and prey species, in addition to their complex reproductive biology, their territorial nature and characteristic small home ranges, indicates that their removal in large numbers could seriously impact wrasse populations at a local level. It is therefore clear that further evidence is needed in order to fully understand the consequences of this fishery on reef systems.

Wrasse are not directly protected by specific UK legislation, and are not listed as a designated feature of either Special Areas of Conservation (SACs, as a European Marine Site, (EMS)), or Marine Conservation Zones (MCZ). They are not currently considered to be keystone species, nor characterising species of any reef communities (as defined by Marine Habitat Classification for Britain and Ireland (v15.03)). However, as a territorial and residential species, wrasse could be considered as part of the faunal component for particular reef communities (e.g. infralittoral rock), and therefore it is Natural England's view that wrasse should be considered in the same way as crabs and lobsters when undertaking a Habitat Regulations Assessment (HRA) or MCZ Assessment. This is because both of these mobile groups are associated with specific habitat types and provide specific ecological roles within those habitats.

As potting for these species currently occurs in the Studland to Portland Site of Community Importance (SCI), its potential impacts on their features will need to be assessed. The HRA should consider the indirect impacts of potting for wrasse on the reef feature, and also the impact of the removal of the target species (i.e. wrasse) as a group associated with the reef communities. There is some uncertainty around this latter point and further evidence is required to assess the functional role wrasse have on the condition of Annex 1 reef features. Natural England is currently reviewing this information and will provide updated advice in due course.

It is recommended that the management of wrasse should also be considered through broader legislative means, such as the Natural Environment and Rural Communities Act (2006) Section 40, and the Marine Strategy Framework Directive (MSFD). In the case of wrasse, these two pieces of legislation should act as an incentive to implement a management strategy that leads to the conservation of wrasse and their sustainable use as a fishery resource. Natural England therefore recognises and welcomes the approach taken by Southern IFCA to manage wrasse under the legislation currently available.

There is no existing evidence that points to the sustainable levels at which wrasse can be removed, and therefore this raises concerns that a further likely increase in fishing intensity could have negative consequences on reef systems. We therefore welcome the proactive approach proposed by Southern IFCA to investigate ways in which to manage potential impacts on wrasse populations. One such way of managing potential impacts could be through the introduction of appropriate minimum and maximum size limitations for each species, to prevent recruitment overfishing and protect the spawning stock. Information on their reproductive biology currently represents the best available evidence on wrasse, and therefore Natural England believe that until more information on the removal of wrasse is known, implementing a size slot would be a sensible way to proceed. We would also support the introduction of measures to fully document the fishery through the collection of fisheries data. Developing this baseline would further our understanding of the fishery and provide a sound foundation on which future management can be developed.

With the impacts surrounding the fishery uncertain, Natural England is keen for a collaborative and consistent approach where possible among the three south-western IFCAs. A joined up approach would find common ground in terms of the data collected and management implemented, while also facilitating data sharing, coordination (non-duplication) of research, and the exchange of information from the industry.

Natural England would like to work with Southern IFCA during the development of these measures, through providing support and/or advice as required. On agreement of the management measures, and to ensure that wrasse are afforded some protection, we would support their implementation before the start of the next fishing season, which is anticipated to commence in March/April 2017.

If you have any queries relating to the content of this letter please do not hesitate to contact me using the details provided below.

Yours Sincerely

Andrzej Narozanski
Lead Marine Adviser
Dorset, Hampshire and Isle of Wight

Email: andrzej.narozanski@naturalengland.org.uk
Tel: 0208 225 6978 / 07920 977418

# Annex 7: 'Wrasse Fishery Assessment' Internship Report by Larisa Lewis (August 2017)

**Assessing the new wrasse fishery in Southern IFCA District**

Since 2016, Southern IFCA has seen the development of a live-capture wrasse fishery in the district for the use in Scottish salmon farms as cleaner fish (Davies, 2016). The Authority is aware of a small number of fishermen that have been consistently operating over this period, with the majority of activity concentrated in Weymouth Bay and around Portland. Wrasse fishermen use small open fishing vessels (<8m length) to deploy and retrieve strings of up to ten baited pots. Captured wrasse are kept in cages in the harbour until they are collected and transported up to Scotland. These fishing methods have been found to be relatively small-scale and non-detrimental to the integrity of the site which has SAC status (Walmsley *et al*., 2015; Davies 2016), and furthermore demonstrates an economically viable small-scale industry (Riley, 2017). However, there is no information regarding the wrasse population demographics nor an estimate of the annual wrasse landings from the Southern District as a whole.

Similar fisheries have emerged prior to this in other districts such as Cornwall IFCA in 2015, and it is probable that these fisheries will continue to emerge as the demand for effective bio-controls such as wrasse continues (D'Arcy, 2013). Cultivating wrasse themselves in aquaculture has been considered (see Karlsbakk *et al*., 2013, Skiftesvik *et al* 2013) yet no large-scale alternative to live-capture is currently in action. Despite the wide-spread nature of these fisheries throughout the UK and Europe, information regarding the impacts on stock abundance and population demographics is still limited. For example, these fisheries have been established in Norway since 1990 (Skiftesvik, 2014) and there have been numerous studies attempting to quantify the effects on wild wrasse populations, though the majority have focussed on goldsinny and corkwing wrasse.

The five wrasse species found in the UK (ballan, goldsinny, corkwing, cuckoo and rockcook) were recognised to have distinct life histories (Skiftesvik *et al*. 2015) which led to the development of species-specific size restrictions and voluntary recommendations in the form of a 7-point 'Fishery Guidance' plan (taken from Gravestock, 2017):

- Species-specific minimum and maximum size limits, with the aim of maintaining population size frequency distributions and promoting recruitment (protecting immature individuals and older more fecund individuals)
- A series of no take zones for wrasse, located within sections of marine protected areas (including Studland to Portland SAC)
- Pot depth restrictions (>10 m)
- Effort restriction through pot limitations
- Seasonal closures
- Monthly fishermen catch returns
- Biosecurity compliance

Importantly, the new fishery in the Southern IFCA District is primarily solely targeting ballan wrasse (*Labrus bergylta*), due to their resilience in both transport and salmon-cages; making them the most effective species for their role in aquaculture (*Leclercq, 2014*). Therefore, it is necessary to consider the potential implications of the removal of this individual species. Firstly, as ballan are protogynous hermaphrodites (Davies, 2016), they are exposed to risks of sex-selective harvesting causing skewed sex-ratios and shifts in size structure (Villegas-Rios *et al*. 2013a). A size restriction was set at 160-280mm to allow caught individuals to have reached maturity and therefore had an opportunity to reproduce prior to being caught. This would also reduce the possibility of removing large, mature males (Gravestock, 2017) which would change social structure and compromise egg survival; as guarding is a male role (Darwall *et al*. 1992). Conversely, size restrictions could affect the population demographics by promoting the survival of small, slower maturing females and very large males.

Furthermore, the resultantly small home ranges from the highly territorial behaviour combined with low genetic diversity between local sites (Villegas-Rios *et al*. 2013a), compared with other wrasse species, leaves them extremely vulnerable to threats such as disease when experiencing fishing pressure. Ecosystem-wide effects of the fishery have been considered to be low; with the potting techniques mirroring those of lobster fisheries and therefore, when correctly deployed causing minimal damage to reefs or species of special interest (Gravestock, 2017). Consequences of removing ballan from their role in top-down grazer control is likely to be mitigated by the presence of the other wrasse species (Halvorsen, 2016). However, as ballan are the largest wrasse species, complications for the health of the ecosystem could still arise as studies have shown reduced effectiveness with a decrease in mean fish size (Figueiredo *et al*. 2005).

Past literature is useful guidance for the development of assessment, however, in order to understand the potential implications of targeting ballan wrasse from a no doubt complex ecosystem, extensive surveying and research will need to be undertaken in order to ascertain the sustainability of this fishery.

It is evident that immediate comprehensive assessments are necessary to understand the impact of this fishery. Already, requirements for long-term and short-term strategies have been identified and outlined by Devon & Severn IFCA in Ross (2017), with the end goal of establishing a Maximum Sustainable Yield. Short-term strategies focus on establishing a relationship between fishing pressure and stock abundance (Ross, 2017), with the identification of the assessment complexities that this fishery faces due to the nature of fishery and the ecology of the target species; small home ranges and therefore effects of hyperstability or hyperdepletion (Ross, 2017).

This report will therefore focus on the current monitoring undertaken by Southern IFCA, providing the foundations for a stock assessment. Data collection has thus commenced ranging from surveys aboard fishing vessels, to landings and catch return data provided by buyers and fishermen respectively. These data will be examined for their strength in providing a short-term stock assessment and further local wrasse population demographics, which will ultimately inform future research direction and management decisions.

**Materials and methods**

Sampling took place during the months of June and July 2017, though was limited by adverse weather conditions, so overall only three potting surveys were carried out aboard local fishing vessels in Weymouth Bay. The area surveyed is characterised by bedrock supporting red algae with an approximate depth range of 5-20m (Axelsson *et al*., 2011); agreeing with previously described wrasse habitat of rocky reefs (Dipper, 2001).

Sampling techniques were those used commercially by the fishermen; hauling pots (72Lx40Wx28H) baited with shore crab (*Carcinus maenas*) and a soak time of 24-48 hours. Wrasse species and by-catch were identified, measured by total body length and released. Due to regulations set out in the 7-point plan by Southern IFCA, pot depth did not exceed 10m. There were no catch mortalities found upon hauling pots, however predatory seabirds were observed feeding on the fish being returned, therefore efforts were made to reduce this. These included releasing the fish very close to the side of the vessel or allowing recovery from depth by keeping fish in sheltered tanks with release at the end of the survey. Duration of sampling varied depending on the number of strings hauled, as some vessels had only 6 strings whilst others hauled up to 9 strings.

Additional data was provided through fishermen's logbooks to give an estimate of Catch per Unit Effort (CPUE) in Weymouth, whilst landings data from the buyers provided an idea of the export of Ballan wrasse from the Southern IFCA District, from April to July 2017.

*The data presented below focusses solely on ballan wrasse, though all by-catch were identified and measured; for location and size information regarding other species e.g. lobsters, please see the raw data. Metadata for each survey can also be found within processed and original datasheets.*

**Results & Discussion**

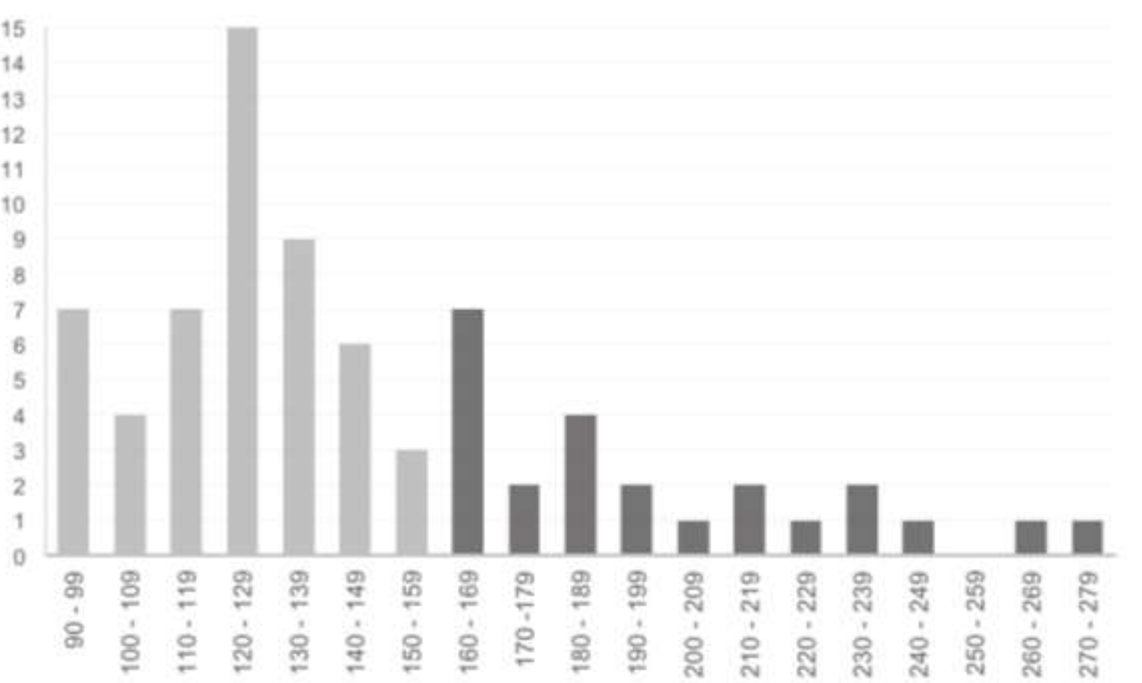
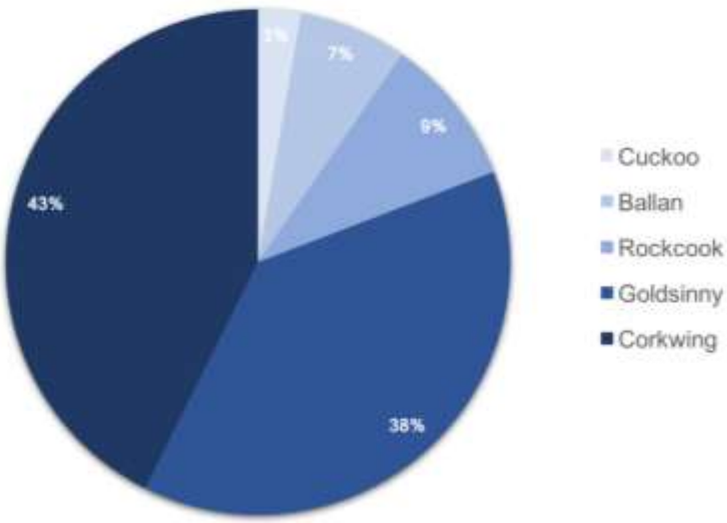



**Figure 1. Range frequencies for the different size classes (mm) of sampled ballan wrasse for all three surveys in Weymouth during June – July 2017. Dark columns represent the wrasse which fell within the 160-280mm size restriction and were subsequently retained by the fishermen.**




 **SIFCA Reference:** SIFCA/HRA/02/002

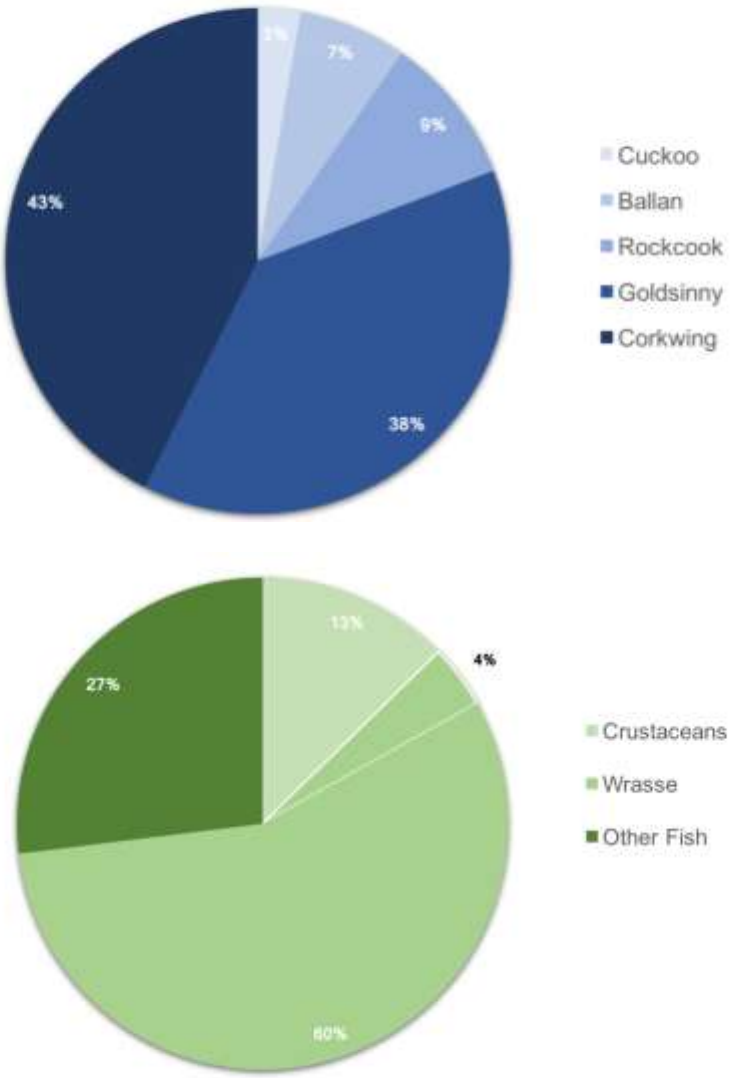



**Figure 2. The species composition of the pots sampled in Weymouth Bay, using data collected from the three surveys during June – July 2017. The top chart shows the species composition for wrasse only; which makes up 60% of the total species composition shown in the bottom chart.**

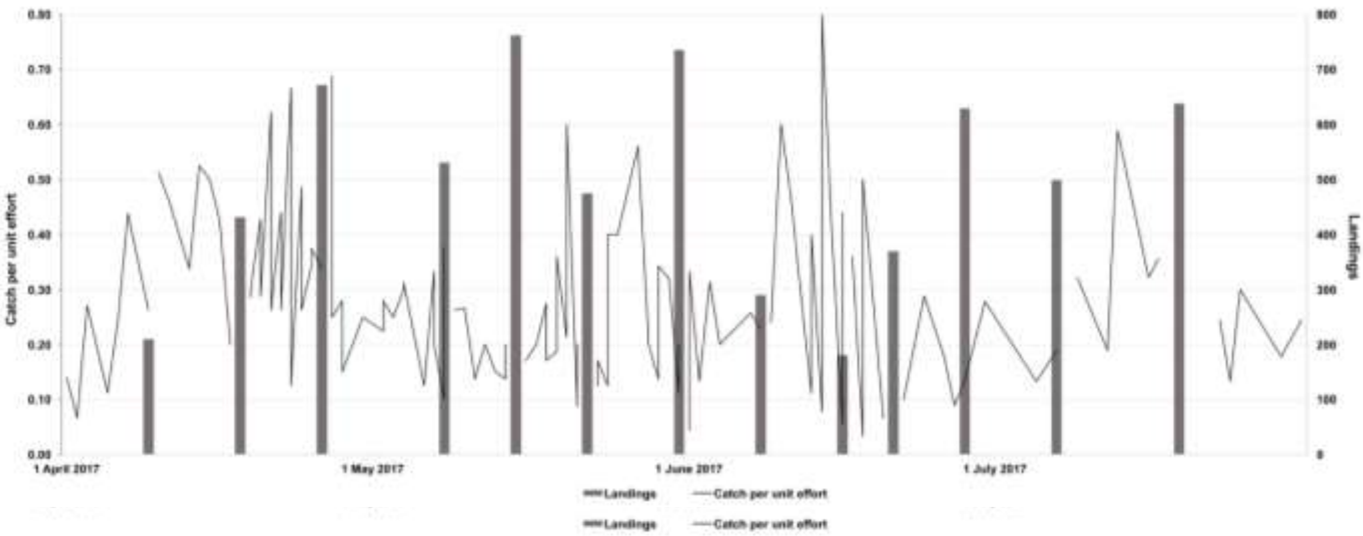


**Figure 3. Potting catch per unit effort of one fisherman in Weymouth, and also the total landings for Weymouth (which includes potting and pole and line catch methods) during April – July 2017.**

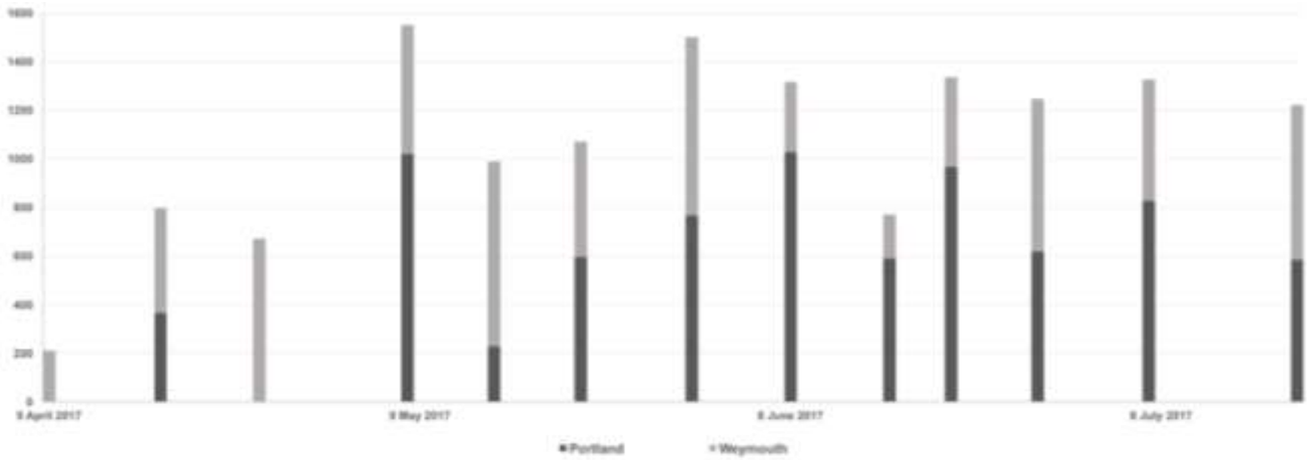



**Figure 4. Total landings for the Southern IFCA District for April – July 2017**

Over the three surveys, 75 Ballan wrasses were caught. However, due to the size restrictions, only 24 of these were retained by the fishermen - as signified by the dark columns in **Figure 1**. The minimum total length measured was 90mm and maximum was 270mm, whilst average total length was 146mm. The undersized majority of caught individuals is clearly shown in **Figure 1**, with 68% of total ballan caught measuring less than 160mm, and 29% of these falling into the size class of 120-129mm.

It could be assumed that these are immature individuals, however it would be useful to mirror techniques used by Halvorsen (2017) to age a sample of this population. This is done by euthanizing a small selection of pots and enables estimations to be made for future years stock population dynamics. Furthermore, a significant error in the data collection was not differentiating the sex of the individual measured; as past research suggests the population will be skewed towards immature females and a small number of large males (Halvorsen, 2016). Though sex could potentially be estimated from the sizes shown in **Figure 1** this is undoubtedly inaccurate, and so useful information regarding stock structure is potentially omitted. Future sampling must therefore ascertain sex when measuring individuals through distinguishing colouration and gonads. Similarly, recording whether individuals are spawning is also beneficial as during the first survey, in mid-June, three spawning corkwings were found. However, since the study focus is on ballan wrasse, future surveys should aim to take place during their spawning period, enabling the current regulations for closed season to be reviewed and made more accurate.

The distinct differences between quantity of undersized and sizeable fish also brings to attention important aspects of the life histories of ballan wrasse. Villegas-Rios *et al*. (2013) found that there are two different morphotypes of ballan wrasse in Atlantic waters, and suggested that there could be greater removal of spotted, slower maturing individuals' due to their larger mean size in comparison to the plain morphotype. Future sampling should therefore aim to distinguish between and record the presence of spotted or plain individuals. This leads onto considering different individual populations of wrasse within the Southern District; studies carried out by D'Arcy *et al*. (2013) found great population differentiation between spatially separated populations i.e. between Norway and UK. However, within regions there was considerably lower genetic diversity which may leave these populations especially vulnerable to fishing pressure (Davies, 2016). Furthermore, Villegas-Rios *et al*. (2013) suggest a link between parasitic infection and timing of sex change in ballan wrasse, so the need to understand population dynamics such as age, sex and links to genetics is evident, as reduced diversity could increase susceptibility to infection Frankham (2002). Therefore, future research into the genetic diversity of local populations using markers such as microsatellites or single nucleotide polymorphisms would be beneficial. However, as emphasised by D'Arcy *et al*. (2013) the lack of currently available markers for ballan wrasse would make this a difficult feat and would require considerable funding.

When looking at the species composition of the area; ballan wrasse made up only 7% of the total wrasse caught during the surveys, whilst corkwing (43%) and goldsinny (38%) made up the majority (**Figure 2**). Therefore, there is good evidence that, with this community, selectively harvesting ballan wrasse may not be detrimental to the wider ecosystem in terms of top-down grazer control. However, inter-specific interactions and ecological niches need to be examined because ballan wrasse could be significantly outcompeted for habitat or prey when under pressure from fishing. Alternatively, this community represents a future conservation strategy; despite the current demand for only ballan wrasse, a compromise to allow stocks to recover would be instead exploiting a highly abundant wrasse species, such as corkwing.

Due to the small amount of data collected from the three surveys, it was not feasible to test for significant differences between the species composition of locations within the bay or across dates. However, future research with a much larger data set, over a longer time scale, could potentially look into this and would allow an insight into population and community structure of wrasses in different localities and seasons. This would be especially useful if comparing the composition between fished areas and MPA's as seen in (Halvorsen, 2017), or when looking at the effect of closed seasons on the population.

So far, this sampling technique has a variety of strengths; most importantly that it is very repeatable and to an extent gives a snapshot of the population. However, due to the size restriction made on the entrance of the pots, fish greater than 280mm, which are generally males or mature females, will be excluded and therefore the population will be under-sampled to some degree. This is also true when considering saturation or the presence of escape gaps; if a pot is full of wrasse or by-catch, due to territoriality, some individuals will purposefully not enter the pots (Davies, 2016; Ross, 2017). Similarly, with escape gaps smaller individuals will also not be sampled.

Notably, only a number of pots actually had escape gaps, which is evident when looking at the large proportion of undersized fish in **Figure 1.** Escape gaps are important for reducing stress on fish which are repeatedly hauled and handled when the pots are consistently placed in their territory (Skiftesvik *et al*., 2014). This stress could have unknown long-term effects, so regulations should ensure that all pots have escape gaps**.** Overall, this exemplifies the need for a combination of sampling techniques such as baited cameras which could give a better insight to population dynamics and also species composition.

With this fishing method, there was a large number of by-catch (**Figure 2),** in total 22 species and 1796 individuals were caught over the three surveys, however ballan made up only 4% of the total catch. This could either reflect low efficiency of catch methods, hence why other techniques such as pole and line are used in conjunction with pots, or other factors may be having influence. Since the fishery effort is concentrated between April and October (Pengelly & Gravestock, 2017), the small number of sizeable individuals could be related to season; suggesting the majority have already been fished. This is emphasised further when looking at the potting catch per unit effort (CPUE), which varies substantially day to day for individual fishermen participating in the April-July surveys. There are undoubtedly a large number of factors which affect the distribution of wrasse and subsequent CPUE. Previous studies such as Darwall *et al*. (1992) have investigated correlations between wrasse abundance and temperature, whereas personal reports from fishermen imply that CPUE could be affected by the underlying tidal cycle. They believe that CPUE is often greater when potting between Spring and Neap tides rather than directly on one. Generally, weather conditions and seasons will have a strong influence, as well as competition amongst fishermen themselves (Halvorsen, 2017). With such a small data set it is difficult to recognise and give weight to trends. This highlights the need for not only collecting more detailed metadata in terms of temperature or tidal streams but also constructing a well-planned sampling schedule for a long-term dataset (> 1 year) that would coincide with different tidal cycles, seasons and overall be more consistent i.e. four times a month or one week straight of sampling.

Furthermore, **Figure 3** shows the CPUE of only one fisherman's landings (also shown on Figure 3) through potting. So, where the CPUE is low and landings are high, it is made up by the other fishermen in the area, or through different catch methods. Therefore, it would be advantageous to have catch return data from all fishermen and all fishing methods. Additionally, to improve the relevance of the catch return data and give an indication of population demographics, it could be worth implementing voluntary size measuring of retained ballan. This could be done when the fishermen are putting their wrasse into storage cages and wouldn't be too difficult or time consuming. Alternatively, Southern IFCA enforcement officers could carry out "sampling" when the fishermen return to harbour.

Overall, when considering the four months of landings data from Weymouth (**Figure 3**), there is great variability over this period. The average number of ballan wrasse bought came to 494, however there are some periods when this was significantly different. For example, in April, at the start of the season, the landings were expectedly low; only 210 ballan sold, which then increased up to the highest landing in mid-May reaching 762 ballan. In mid-June, there was a significantly large drop down to 181 ballan. It is difficult to discern whether there are any meaningful trends behind these findings, they could reflect spawning patterns, catch methods or as discussed above, be a result of an array of factors. It is worth mentioning that the number of strings per vessel increased over the period; with one fisherman going from 6 strings up to 9 (totalling 30 more pots). Pengelly & Gravestock (2017) recommended a maximum number of 8 strings per vessel, so the Authority should consider enforcing this. Further, the minimum sizes rely on the integrity of the fishermen, so the high landings could be a result of taking under-sized fish and regular enforcement will be necessary to avoid this.

The landings data shown in **Figure 4** provide a baseline for the current magnitude of exploitation; over the 4-month period a total of 14,009 ballan wrasse were exported out of the Southern District, with 7584 from Portland and 6425 from Weymouth. The Authority could potentially use this data in the future to set a landings cap for the district, as it is evident that Weymouth is not the only port in the Southern District seeing substantial fishing activity; landings in Portland are on average 195 fish higher. Consequently, future surveys should focus on both Portland and Weymouth, and engage in data collaboration with Cornwall and Devon & Severn IFCA districts, who are too undertaking survey work investigating the impacts of the wrasse fisheries. It is also worth noting from Figure 2 that lobsters make up 13% of the total catch and could potentially be used in future assessments as grounds for comparison, in terms of CPUE, with previous potting studies assessing the sustainability of lobster fisheries using catch data.

The sampling methods thus far give an accurate indication of what the fishermen themselves will be catching, and is therefore highly representative of the commercial fishery. However, when considering populations and stock assessments, as mentioned by (Ross, 2016), difficulties arise with these surveys and catch return data being spatially biased; fishermen target areas where they have highest catch and tend to move their equipment to reflect areas of high fish density. The alternative to this is carrying out systematic random sampling aboard chartered vessels as suggested by Ross (2017), which would also remove reliance on fishermen for surveying. However, this is a considerably more expensive and time consuming than the current sampling method.

Future methods of assessing the fishery outlined throughout the report include:

- Comparison of wrasse abundance and size between protected and unprotected areas within the district
- Population aging via euthanizing samples
- Genetic studies
- Time-series comparison of species composition
- Enforcing the presence of escape gaps
- Baited camera
- Devising a well-structured long-term sampling regime
- Voluntary measuring of catch, or regular sampling by Southern IFCA Officers
- Enforce maximum number of strings per vessel
- Surveying at all ports in the Southern District
- Using charted vessels

This is not necessarily a comprehensive list since techniques such as mark capture release could provide valuable information on home-ranges and ballan ecology, but may not be essential for providing a short-term, baseline stock assessment. Future assessment will therefore take these recommendations into account and decide which are the most useful and cost-effective to the long-term goal of a complete stock assessment.

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# Annex 8. Natural England Scoping Advice on the potential impact of the wrasse handline fishery.

Date: 08 February 2019
Our ref: 270446270446
Your ref: Request for scoping advice

Chloe Smith
Southern Inshore Fisheries & Conservation Authority
64 Ashley Road
Parkstone
Poole
Dorset
BH14 9BN

NATURAL ENGLAND

4th Floor
Eastleigh House,
Upper Market Street,
Eastleigh,
SO50 9YN
T: 020 8026 1465 M: 07500976782

## BY EMAIL ONLY

**FORMAL SCOPING ADVICE REQUEST: Commercial Wrasse Rod And Line Fishery. Studland To Portland SAC.**

Thank you for requesting Natural England's scoping advice regarding the live wrasse commercial rod and line fishery in the Studland to Portland Special Area of Conservation (SAC), which was received on 10th January 2019.

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.

**Overview**

Natural England has previously provided formal advice to Southern IFCA on the management of the emergent live wrasse fisheries during the HRA process for the fixed gear (pot and trap) fishery. This process was undertaken to fulfil Southern IFCA's obligation as the competent authority under the Habitats Directive. Article 6.2 of the Habitats Directive requires appropriate steps to be taken to avoid the deterioration of natural habitats and habitats of species within Natura 2000 sites, as well as significant disturbance of the species for which the area has been classified. Natural England's previous advice, and the respective management strategy taken by Southern IFCA, is relevant to protecting the ecological value of target wrasse to SAC reef ecosystems as cleaner fish and mesopredators, and should therefore be considered alongside any new advice directly regarding the rod and line fishery as detailed below. However, due to the differing potential impacts associated with rod and line fisheries, Natural England welcomes Southern IFCA's proactive approach in seeking advice.

Currently, Natural England understands the rod and line fishery to target the same species, within the same habitat i.e. infralittoral rock, as the fixed gear fishery. However, Natural England understands the rod and line fishery to be of a smaller scale with regard to vessels and effort in comparison to the fixed gear fishery. Further information, particularly regarding the exact method of rod and line fishing, the total area fished and seasonality of the fishery, is required by Natural England for the reasons discussed later in this letter.

**Studland to Portland SAC**

**Designated features**

The Studland to Portland SAC contains biologically and topographically diverse areas of reef considered to be of excellent quality and structure. The reef habitats have been designated due to their outstanding diversity and excellent conservation value on an international scale. The site comprises an area of Annex 1 reef habitat of approximately 19194.38 ha, which is 57.83% of the total site area. The reef habitats found in the site include bedrock reef (chalk, limestone and shale), as well as stony (boulder and cobble on sediment) reef, and are home to a diverse assemblage of epifaunal species.

Reefs in the Studland to Portland SCI are located across the entire site from the eastern to the western boundaries. They extend out over 10km from the shore at St Alban's Ledge, and down deeper than 60m around Portland Bill. The reefs are divided into three sub-features: infralittoral rock, circalittoral rock and subtidal stony reef.

Infralittoral reefs where communities are usually characterised by algae such as kelp forests, extend across the coastal fringes of the site in shallow waters. They are characterised by flat bedrock mixed with areas of boulders, cobbles and mixed sediment.

Circalittoral rock dominates the site. This is rock in deeper water, where communities tend to be dominated by animals attached to the rock rather than algae. It is interspersed with a variety of different sediment types ranging from fine sand to large cobbles.

Stony reefs are characterised by stable boulders and cobbles over lying sediment. Like circalittoral rock stony reef are located in deeper water and characterised by animal dominated communities.

The structural complexity of the reefs that supports the diverse range of epifaunal species in turn supports a diverse suite of mobile species such as crabs, lobsters and wrasse. The site also contains a number of warm-water species such as *Alcyonium glomeratum* (red sea fingers) and *Holothuria forskali* (black sea cucumber), as well as other rare species, such as the Weymouth carpet coral *Hoplangia durotrix)*.

Wrasse are not directly protected by specific UK legislation, and are not listed as a designated feature of either Special Areas of Conservation (SACs, as a European Marine Site, (EMS)), or Marine Conservation Zones (MCZ). They are not currently considered to be keystone species, nor characterising species of any reef communities (as defined by Marine Habitat Classification for Britain and Ireland (v15.03)). However, as a territorial and residential species, wrasse could be considered as part of the faunal component for particular reef communities (e.g. infralittoral rock), and therefore it is Natural England's view that wrasse should be considered in the same way as crabs and lobsters when undertaking a Habitat Regulations Assessment (HRA) or MCZ Assessment. This is because both of these mobile groups are associated with specific habitat types and provide specific ecological roles within those habitats.

**Conservation Objectives**

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

**Potential impacts that could prevent the achievement of Conservation Objectives**

Natural England considers three medium-high risk pressures associated with the commercial live wrasse rod and line fishery when determining whether the activity may present an impact on the Conservation Objectives of the Studland to Portland SAC. These are:

- The impact of the removal of target wrasse species (principally Ballan wrasse (*Labrus bergylta)*, Rock cook (*Centrolabrus exoletus)*, Corkwing wrasse (*Symphodus melops*), and Goldsinny (*Ctenolabrus rupestris*) on the reef ecosystem.
- The impact of removal of non-target species, be it wrasse outside of slot-limits or other species.
- Abrasion/disturbance of the substrate on the surface of the seabed associated with anchoring or other pertinent aspects of the fishery.

The above advice is based upon Natural England's Advice on Operations, within which the closest commonly occurring marine activity undertaken in the SAC to the wrasse rod and line fishery is 'anchored nets and lines'. Therefore, further information regarding these pressures can be found at the respective Studland to Portland SAC Advice on Operations. This information can be found at:

https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030382&SiteName=studland&SiteNameDisplay=Studland+to+Portland+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea

As mentioned, Natural England has previously provided advice on the wrasse pot and trap fishery. This advice, in brief, drew attention to the intrinsic value of wrasse, particularly to the ecology of inshore reefs. Wrasse have been highlighted by the important ecosystem function they play as a cleaner species. Cleaner fish are widely recognised as an integral part of maintaining the overall health of reef systems through the removal of parasites and by cleaning damaged tissue from fish and other marine organisms. The removal of significant numbers of wrasse could have unwanted negative impacts on animals that require cleaning, and therefore the overall health of the reef. The position wrasse occupy within the food web as both predators and prey species, in addition to their complex reproductive biology, their territorial nature and characteristic small home ranges, indicates that their removal in large numbers could seriously impact wrasse populations at a local level, as well as wider reef communities.

Currently, there is little evidence that points to the sustainable levels at which wrasse can be removed. Therefore this raises concerns that a further likely increase in fishing intensity could have negative consequences on reef systems. Consequentially, Natural England strongly recommends that the precautionary principle be considered throughout the Habitats Regulations Assessment (HRA) process, and be ultimately implemented within any management strategies Southern IFCA consider.

**Request for additional information**

Natural England requires the following additional information regarding the wrasse rod and line fishery, which will enable Natural England to be able to provide full and pertinent advice on the impacts of the fishery on the Studland to Portland SAC.

**Impact of Post-Release Mortality**

By-catch within rod and line fisheries, particularly in reef areas with high species density, is of a concern due to the potential impact of post-release mortality (PRM). Line fisheries are, in comparison to net and pot fisheries, associated with higher PRM level. The use of differing baits, barbed non-circle hooks or treble hooks can lead to damage in by-catch, be it non-target species or target-species outside of slot sizes. Additionally, minor barotrauma, incorrect handling, air exposure and exhaustion can exacerbate PRM. The reduction of PRM is beginning to receive more focus from fisheries managers on both the international and national stage, and, as a manner of best practice, should be incorporated into new management strategies. Natural England recommends more information be gathered on the exact methods employed (baits, lures, number and type of hooks), how these are fished (on-bottom or in the water column), and the effort levels associated.

**Area of the fishery**

The pot and trap wrasse fishery utilises fixed gear with a limited spatial impact in order to harvest wrasse, a key consideration in determining the potential of LSE and the consequent decision that no adverse effect would be presented on site integrity by the wrasse pot fishery. Indeed, within Natural England's previous advice, it was noted that within the SAC, ~1.5% of the SAC was open to fishing, of which only 0.8% of the reef was fishable by the fixed gear fishery. However, as commercial rod and line boats often operate whilst drifting and are not limited to fishing areas due to gear-restrictive benthic topography, vessels can therefore target more individuals, as well as a greater range of by-catch on a larger spatial scale. Natural England therefore requires further information regarding the area the fishery will exploit and whether the vessels associated will drift or fish from anchor.

**Seasonality**

Currently, Natural England is unclear on the seasonality of the rod and line fishery. As wrasse exhibit a variety of differing spawning times/behaviours between species, understanding when the fishery operates, and if variations in fishing effort occur during said season, will allow Natural England to advise on temporal management strategies.

**Clarification of preferred wrasse species**

A further data gap identified by Natural England regards the exact species of wrasse targeted and/or landed by rod and line fisheries. Currently, Natural England assumes that the rod and line fishery targets the same species as the pot and trap fishery, but due to differing fishing methods and gear selectivity, Natural England requires further clarification.

**Summary**

In conclusion, Natural England recommends that Southern IFCA include within the HRA for the wrasse rod and line fishery within the Studland to Portland SAC the following information:

The three primary pressures identified within the Studland to Portland SAC Advice on Operations, as detailed in section 3 of this letter.

The further information requested, as detailed in section 4 of this letter.

**Further considerations**

An in-combination assessment may need to be considered depending on the outcome of the screening stage. Should this eventuality occur then it is NE's view that commercial wrasse potting and the recreational wrasse fishery should be considered in this assessment.

6.1 **Commercial wrasse potting:** Natural England notes that previously, the commercial wrasse potting fishery presented a risk of a likely significant effect upon the SAC reef feature. In addition, Natural England understands that, frequently, bycatch from other fisheries are utilised for bait within the pot and trap fishery, leading to further concern regarding in-combination effects.

6.2 **Recreational wrasse fishery:** Due to the territorial/residential nature of wrasse, and the fact that the commercial wrasse fishery operates within the infralittoral zone (>10m depth), in-combination effects with the rapidly growing wrasse recreational fishery are possible. Although recreational sea anglers are unlikely to actually harvest wrasse, and fish welfare is a concern amongst anglers, there are likely to be synergistic pressures on wrasse associated with both fisheries. Currently, the recreational wrasse fishery is poorly understood by managers, but, as an increasing number of European fish stock assessments incorporate recreational fishing impacts, further investigation of potential in-combination effects is recommended.

6.3 **Fisheries management considerations:** Gear size selectivity within commercial line fisheries has been highlighted as an important management consideration across the primary literature, particularly due to associated impacts on population structure. Rod and line fisheries, particularly those using larger baits and hooks, are often selective of larger individuals, particularly when the target species exhibits territorial behaviour and high levels of intra-species competition. Conversely, the use of small baits can attract a higher incidence of by-catch and deep hooking. Natural England notes that, currently, the slot size for commercially landed wrasse is a voluntary by-law, and although Southern IFCA has reported that compliance amongst commercial fishermen is high, in order maintain adherence to the precautionary principle, Natural England advises that Southern IFCA consider examining mandatory slot-limits for wrasse in the region during the Appropriate Assessment (AA) stage.

Natural England would finally like to thank SIFCA for their continued efforts and looks forward to a continued positive partnership in the management of all live wrasse fisheries. For any further questions or help, including an overview of the primary literature related to the content in this letter, please do not hesitate to contact me using the details provided below.

Kind regards,

Alex Maydew BSc (Hons), MRes

Marine Lead Adviser: Dorset Coast

Office: 020 8026 1465

Mobile: 07500 976782

Email: alex.maydew@naturalengland.org.uk