Emerging Wrasse Fishery within D&S IFCA District

The Wrasse Fishery

Wrasse are used as cleaner fish in Scottish salmon farms to control sea lice populations. To meet demand, wild wrasse are being sourced from southwest England. In the Devon and Severn IFCA district vessels have been operating out of Plymouth since 2015 and a fishery is expected to start in Torbay this year (2017). The fishery uses specially designed pots and targets five species of wrasse. Although the fishery emerged in the 1990's in Norway, Scotland, Ireland and England, there is little information on the impact of these fisheries. Where data exists, local depletions and changes to size structures and sex ratios have been noted.

From conversation with all aspects of the industry, the IFCA has gathered as much information as possible on the current fishery and the proposed extension to the fishery in 2017. Within the South West, the wrasse fishery is currently supplying fish to two salmon farms in Scotland. To protect anonymity these two salmon farms have been called Farm 1 and Farm 2. Farm 1 has two agents supply fish to them. These will be known as Agent X and Agent Y. Salmon Farm 1 is looking to expand its supply from boats based within the District. Salmon Farm 2 has informed D&S IFCA officers that it is not looking to expand the demand by taking wrasse from boats fishing in Devon waters.

Agents X and Y for Salmon Farm 1 currently have engaged boats from Cornwall, Plymouth and Weymouth to supply wild wrasse to them and Salmon Farm 2 is supplied directly by boats from Cornwall and Weymouth. Agent X for Salmon Farm 1 has provided three boats from Plymouth with pots and holding tanks on their vessels. These boats currently fish with between 120 and 200 pots each. This agent is looking to increase the number of boats supplying wrasse from Plymouth to four, the fourth boat working 150 pots. The agent has engaged three boats fishing out of Brixham to join the fishery for 2017 and they will be working with 150 pots each.

Agent X also has a few boats working out of Weymouth with 100-120 pots supplying him with wrasse. Agent Y, based in Weymouth, has four boats in the Weymouth area working 2-mile square areas of sea with 40-60 pots.

In Cornwall, two vessels are currently fishing for wrasse, each working between 150-200 pots supplying Agent Y for Salmon Farm 1 and Directly to Salmon Farm 2. A summary of the information gathered from the salmon farms, their agents, Marine Scotland and Scottish Marine Heritage is provided in the spreadsheet below:

Information on Existing Wrasse Fishe

During 2016, Colin Trundle from Cornwall IFCA collected data during on board surveys with the fishermen in Cornwall. The document below gives information on the species and numbers of different size individuals caught. This survey work provides information on what

the introduction of slot sizes would do to the composition of catches and the number retained.


Size plots.pdf

Rachel Irish from the MMO has provided figures of retained catches for five boats working out of Weymouth and Portland. The table indicated that for a period of 18 weeks between August and November 2015 the five boats caught 57,275 wrasse. These boats have between 35 and 60 pots each. The figures are shown in the document below:


Wrasse figures Weymouth 2015.pdf

Wrasse Ecology

All five species of wrasse live inshore, on rocky reefs and seagrass beds. However, each of the species has different life-history traits such as habitat requirements, size at sexual maturity, spawning season and depth range. Wrasse display complex reproductive biology and are highly territorial, occupying small spatial areas. A detailed report has been produced with information on wrasse ecology, biology and fisheries interaction. This document provides information on the wrasse fisheries in Ireland and Norway; some information regarding the emerging fishery in the D&S IFCA's district and implications of the fishery on habitats and the ecosystems. This document can be viewed below:


A review of wrasse ecology and fisheries

The table below has been taken from this document and summarise the biology of the different wrasse species:

Table 1 - Summary of life history characteristics of all five common wrasse species, adapted from Darwall *et al.* (1992). "?" indicates unknown.

Characteristics	Ballan wrasse (*Labrus bergylta*)	Cuckoo wrasse (*Labrus mixtus*)	Rock cook (*Centrolabrus exoletus*)	Goldsinny (*Ctenolabrus rupestris*)	Corkwing (*Symphodus melops*)
Size range (cm)	Typical size 30-40cm (Campbell, 2004; Irving, 1998; Dipper, 1987). Grows to over 50cm (Naylor, 2005; Bagengal, 1985). Up to 60 (Gibson, 2001; Darwall *et al.* 1992; Dipper, 1987).	Grows to 35cm (Campbell, 2004; Gibson, 2001; Darwall *et al.* 1992; Dipper, 1987; Bagengal, 1985) and females generally smaller (Naylor, 2005; Irving, 1998).	Usually grows to 12cm (Dipper, 1987), but some reach 15cm (Naylor, 2005; Campbell, 2004; Darwall *et al.* 1992; Bagengal, 1985; Dipper, 1987).	Usually 12cm, some reach 18cm (Gibson, 2001; Irving, 1998; Dipper, 1987). Up to 15cm (Kay, 2009; Campbell, 2004; Darwall *et al.* 1992). Up to 20cm (Naylor, 2005).	Usually 15cm, some reach up to 25cm (Kay, 2009; Naylor, 2005; Campbell, 2004; Gibson, 2001; Irving, 1998; Darwall *et al.* 1992; Dipper, 1987). Rarely grows above 18cm (Bagenal, 1985).
Maximum age (years)	29 (Dipper *et al.* 1977)	17	9 (Treasurer, 2005)	16 (Treasurer, 2005)	9
Age at maturity (years)	Females & males 6-9	Females 2, males 6-9	Females 2	Females 2	Females 2-3
Size at maturity (cm)	Females 16-18, males 28	Females 16, males 24	?	9.5	10
Sex change	Yes	Yes	?/No	No	No
Accessory males	No	No	?	Yes	Yes
Territorial	Yes	Yes	Yes	Yes	Yes
Spawning season (Atlantic)	April - August	May - July	May - August	April - September	April - September
Spawning place	Nest (gravel & rock)	Nest (gravel)	?	Mid-water	Nest (algae)
Fecundity (1000 eggs yr^{-1})	150	?	?	20	50
Egg type	Benthic	Benthic	Benthic	Planktonic	Benthic
Nest building by	Female	Male and female	?	N/A	Male
Parental care	Male	Male	?	None	Male
Key habitat	Juveniles found in the intertidal and rock pools, adults found in sublittoral rocky areas (Dipper *et al.* 1977), reef and kelp forests.	Sublittoral rocky reefs (Naylor, 2005; Dipper, 1987).	Rocky reefs and seaweed (Naylor, 2005; Dipper, 1987). Often found in seagrass beds (Dipper, 1987).	Rocky reefs and boulder slopes, with holes, caves and crevices for refuge (Sayer *et al.* 1993). Distribution unaffected by macroalgal cover (Sayer *et al.* 1993).	Common in the intertidal and rock pools, with dense seaweed. Subtidal rocky areas with dense seaweed. Often found in seagrass beds (Dipper, 1987).
Depth (m)	Depth range from 5m to at least 30m (Ager, 2008; Dipper, 1987). Juveniles can be in <5m.	Depth range from 2-200m, but mainly between 20-80m (Gregory, 2003).	Depths of 3-25m (Galeote *et al.* 1998; Dipper, 1987).	Occasionally found <10m, mostly juveniles (Sayer *et al.* 1993). Prefer deeper water between about 10 to 50m (Campbell, 2004; Gibson, 2001; Irving, 1998; Sayer *et al.* 1993; Dipper, 1987).	More commonly found at depths <5m (Darwall *et al.* 1992; Costello, 1991), although they can occur to depths of 30m (Gibson, 2001; Irving, 1998; Bagenal, 1985) or up to 50m (Skewes, 2008).
Exposure	All conditions of exposure (Gibson, 2001). Mostly found in intermediate wave exposure stations (Skiftesvik *et al.* 2015).	No specific exposure level, found at all stations (Skiftesvik *et al.* 2015).	Relatively more abundant at more exposed stations, Smaller fish (<11cm) occurred mainly in sheltered areas (Skiftesvik *et al.* 2015).	Mostly found in intermediate wave exposure stations, Smaller fish (<11cm) occurred mainly in sheltered areas (Skiftesvik *et al.* 2015). Distribution unaffected by current speed (Sayer *et al.* 1993).	More abundant in sheltered area (Skiftesvik *et al.* 2015). Nests found in sheltered north facing crevices (Potts, 1985).
Main diet type	Crustacea and Mollusca	Crustacea and Mollusca	Crustacea and Mollusca	Crustacea and Mollusca	Crustacea and Mollusca

Marine Protected Areas

The fishery in the D&S IFCA district occurs almost entirely within marine protected areas (MPAs). The fishery has the potential to alter the species population structure and wrasse community composition through preferential targeting of different sizes/species and differences in catchability. Indirect effects could include changes to social structures, sex ratios, egg survival and the genetic stock structure. Additionally, the impact of removing wrasse from rocky reefs could lead to wider ecological changes on the effected reefs, known as trophic cascades. D&S IFCA will therefore need to undertake detailed MPA assessments.

Research Requirements

Due to complex spatial interactions between fishing effort and stock abundance and the need to undertake detailed MPA assessments, D&S IFCA officers believe that the implementation of a fully documented fishery is necessary. This should include compulsory logbooks for all fishermen and additional on-board observer data collection. Additional work looking at catch efficiency of pots will help with interpretation of the effort data. In the medium to long-term dedicated survey, options should be considered. A partnership including other IFCAs, industry, Cefas and universities may be required in the long term to determine the correct unit of management and assess direct and indirect impacts of the fishery. A paper on research option and data collection priorities is provided below:

Data collection priorities for an emerg

D&S IFCA Potential Wrasse Management

The wrasse fishery can be managed through the D&S IFCA Potting Permit Byelaw, via the flexible permit conditions.

Management of this emerging fishery is seen as important as there a number of risks that have been identified from the information gathered on the species ecology, biology, the expected fishing effort and data collection requirements. The risks are:

- Whilst information on the level of effort has been provided by the salmon farms directly or by their agents, the IFCA is aware that fishermen within the district can act independently to engage with the salmon farm companies to offer a supply of wrasse to them. During phone conversations with some of the farms that do not currently take wrasse from the Southwest, the IFCA officer was asked if she was able to supply wrasse to them or knew of fishermen that could. This highlights that there is a level of interest that has not yet been acted upon. Agent Y for Salmon Farm 1 operates out of Weymouth and has advertised through the website 'Find a Fishing Boat' for more boats to supply wrasse to them. Therefore, the IFCA does not know if the effort in its district will increase further that currently predicted in 2017.
- There is a huge amount of uncertainty in the fishery, in terms of the impact of the removal of wrasse from the habitats and ecosystems in which they live. The uncertainty includes how the removal of mature wrasse will effect their population structure, reduction in their cleaning capability leading to disease prevalence/ infestation on other fish species, kelp epifauna ecosystem impacts and populations of those species wrasse currently predate on, such as amphipods and isopods – 'trophic cascade' impacts.

- For Ballan and cuckoo wrasse the impact on the populations of the removal of the dominant males is largely unknown.
- No stock assessment has been undertaken on this species so baseline data are not available.
- The wrasse fishery in the UK is largely undocumented although in Scotland it has been taking place for many years. This lack of data leads to the uncertainty on the impact of the fishery.
- Anecdotal evidence from fishermen targeting wrasse in Scotland suggests there is a decline in the wrasse numbers being landed. Work done in Ireland suggests that the fishery has declined in areas after two years of the fishery taking place.
- The fishery period partly coincides with the spawning period for all species

The benefits of the emerging fishery are:

- It allows small inshore vessels to diversify for some of the year.
- It potentially can remove or lessen the pressure on other fisheries and species
- This is an opportunity of the IFCA to help the development of a new fishery whilst introducing management that ensures its sustainability and increases the IFCA's knowledge of any impact on the inshore ecosystems where the activity takes place.

Management Options

Fully Documented Fishery

To date, the landings from the fishery appear to have gone unrecorded. The boats are under 10m in size and as such, the requirement for landings figures is not obligatory. However, sales notes for those purchasing the fish and the transport documents should be available. The MMO is looking at what data exists.

In order to ensure as much information is available, a fully documented fishery is recommended where data are made available to D&S IFCA including:

- daily records of fish removed from the fishery (landings to the shore / into store cages) are kept
- number of pots deployed
- frequency of hauling per day
- number of strings fished
- number of pots per string
- days at sea,
- areas worked (GPS location for start and end of strings).

These data will provide information on landings per unit effort (LPUE).

Part of the requirement for the fishery would be to allow observers on board the vessels on a regular basis to verify the logbooks and to collect further data on the whole catch rather than just those fish landed. The data would include catch composition by species, size distribution and determine size at sexual maturity and allow for catch per unit effort (CPUE) to be determined. This together with LPUE will help inform assessment of stock abundance and highlight changes over time.

In order to support the data collected from fishermen and on board survey work, it is important to have sales figures and transport document data so that additional movement mortality can be assessed.

Slot Size

From the information collected, the introduction of a formal slot size might appear appropriate. This could tally with the salmon farm industry sizes to reinforce these voluntary minimum and maximum sizes. It would also allow potential harmonisation with CIFCA and SIFCA should these IFCAs decide to manage the sizes of wrasse through a byelaw. A conventional byelaw may take months or years to introduce management measures, unless an emergency byelaw is implemented. Slot sizes allow the larger fish to remain in the population so affording protection to the breeding stock. The disadvantages of a formalised slot size, under permit conditions, are:

- Each species of wrasse has different size ranges and sizes at maturity and therefore a generalised slot size would not account for these species differences. Individual species slot sizes would therefore be more appropriate. However, this would make enforcement more difficult and be resource intensive.
- Handling of the fish more often than is needed, through enforcement operations, may cause stress to the fish and lead to increased mortalities

The salmon farms have informed the IFCA they ensure that the fishermen adhere to their industry led slot sizes, which are between 12 cm and 23 cm. The current industry slot size does allow a proportion of all species to reach sexual maturity. Protection is afforded to the larger Ballan and Cuckoo wrasse individuals as the maximum size is below the maximum size they grow too. One Salmon Farm Agent has suggested that an increase in minimum size for Ballan wrasse might be considered. For Rock Cook, Goldsinney and Corkwing wrasse the minimum size is close to the maximum size to which the species grow. These three species mature at 9 to 10 cm, which is 2 to 3 cm below the minimum industry size, and therefore a small proportion of the breeding stock is protected. The Salmon Farm industry is concerned that if a generic increase in the minimum landing size across all species is introduced it will remove the opportunity to catch goldsinney, rock cook and corkwing wrasse (which are good cleaner fish for the salmon) and would make the operation in Devon unviable and remove the opportunity for the fishery to develop.

Until detailed data are collected on the size composition for each species caught and size of sexual maturity, a generalised slot size under the permit conditions may not be appropriate at this time. This can be reconsidered when analysis of data is undertaken and further planned work by SIFCA and CIFCA can help inform any potential measures, including slot sizes that may be considered by D&S IFCA. However, the Byelaw and Permitting sub-committee may wish to consider formalising the slot size through the introduction of a Permit condition.

Effort Limitation

The figures gathered for the current and future level of effort in the South West ranged from 40 pots to 200 pots per vessel. In Devon the main agent (Agent X) representing Salmon Farm 1 is looking to have all the boats that supply him operating 150 -200 pots. The figures for catches from the Weymouth fishery show the number of fish caught with a small number of pots (<60). Three of these boats caught between 14,902 and 16,860 fish each over an 18 week period in 2015. Correspondence with SIFCA suggests there are more boats operating in its district, with up to seven boats using 50-150 pots each. However, clarification of exact figures is needed. SIFCA believes that more boats will be joining the fishery in 2017 and that

anglers are now supplying wrasse to the commercial boats to supplement the supply to the Salmon Farms

In order to allow for a wrasse fishery to develop but avoiding over exploitation of the stock, effort control via pot limitations could be introduced. D&S IFCA officers have considered the options for a limit on the number of pots to be used by each fisherman in the district. This effort control would establish a viable additional fishery, in the form of diversification, rather than a fully targeted wrasse fishery. If a pot limit is introduced that is lower than the amount of gear currently used by the existing fishers in Plymouth, these fishermen would be able to place a number of pots (that exceed the D&S IFCA limit) in the Cornish part of the Plymouth Sound, as one or two of them currently do. Therefore, the impact financially of this effort control to exiting fishers would be minimised. Those fishermen new to the wrasse fishery, for example in Brixham, are unlikely be impacted financially. They have not prosecuted the fishery as yet, and as most of the vessels, known to be interested in joining the fishery, are supplied with pots and holding tanks by Agent X for Salmon Farm 1, there would be minimal financial impact to these fishermen. It is not known what the impact of limitations to those acting independently of the Salmon farm Agents will be, but one fisher has suggested he will be purchasing 500 wrasse pots.

D&S IFCA officers are hoping to gather more data during on board surveys, as part of the fully documented fishery proposal. However, these data are not yet available to help inform management of the fishery. In order to try to ascertain a level of effort that would allow a fishery to continue, and in consideration of a precautionary approach by D&S IFCA, the data collected by other IFCAs have been looked at in more detail. The following basic analysis of figures provides an indication of effort and number of fish removed:

Southern IFCA

- In 2015, 57,275 fish landed from 5 boats with a total 228 pots
- In 2016, approximately 100,000 fish landed from 7 boats with a total of ~700 pots

Cornwall IFCA

- In 2016, 70,000 fish landed from two boats with a total of 350 pots

From these the number of wrasse caught per pot has been estimated as~:

SIFCA – 251 wrasse per pot per season in 2015

SIFCA – 143 wrasse per pot per season in 2016

CIFCA – 200 wrasse per pot per season in 2016

Therefore, the mean number of wrasse per pot for these fisheries is 198 wrasse per pot per season.

There are known to be 7 boats (involved with Agent 1) interested in joining the 2017 fishery along with one independent vessel in the DIS IFCA district. If D&S IFCA considered the introduction of pot limitations, the relationship between number of fish landed to number of pots used is estimated as follows:

Pot limit per vessel	Total number of Pots for 8 vessels	Estimate landings of wrasse
50	400	79,200
75	600	118,800
100	800	158,400
150	1200	237,600

Whilst this is the predicted level of effort for 2017, the IFCA will not know the actual number of vessels who want to take part in the fishery until the consultation on permit changes commences. The Byelaw and Permitting sub-committee needs to consider if pot limitations are an appropriate management measure, and what the limit should be set at. It is also suggested that as part of this management approach all pots used in the wrasse fishery are tagged for monitoring and compliance purposes.

Seasonal Fishery

From the literature reviewed wrasse spawn in spring and summer. For some species, the spawning season starts in April and continues to September, whereas the spawning season for other wrasse species is shorter extending from May to July. As there is no literature for the wrasse species' spawning seasons in the South West, the on-board surveys will gather more data on this aspect of the biology of each species. The industry led slot sizes will take the larger breeding fish from three species of wrasse: rock cock, goldsinney and corkwing. Therefore, to provide some protection to these species, a closure for part of the spawning season might be a suitable management measure. In 2016, the fishery in Norway was prohibited until 11th July as a conservation measure to allow some nesting males and females to breed at least once before being harvested. As all the wrasse species spawn from April or May, a closure during these months would afford some protection but allow the fishery to progress over the summer months.

The Byelaw and Permitting sub-committee may wish to consider the introduction of a closure of the fishery for April and May. As a more precautionary measure, this closure could be extended and include June if that is thought to be more appropriate. However, this extension might lead to greater pressure on the stock in the remaining months of the fishery

Recommendations

The Byelaw and Permitting sub-committee considers the recommendation that a consultation is conducted on the following changes to the conditions of the Potting Permit:

1. The wrasse fishery is fully documented, where there is a requirement for detailed data on landings from each vessel, sales notes from the buyers of the fish and transport documents to be provided to the IFCA
2. A limit to the number of pots to be used in the D&S IFCA district. *A decision needs to be made on what limit should be consulted on.*

3. Each pot will be tagged with a tag issued by D&S IFCA
4. A closed season is put in place to protected part of the spawning cycle. *A decision needs to be made on what limit should be consulted on.*
5. *The Byelaw and Permitting sub-committee may wish to consider formalising the slot size through the introduction of a Permit condition.*