Summary for Byelaw & Permitting Sub-Committee:

Annual Review of the Live Wrasse Fishery

in Devon and Severn IFCA's District, 2017 – 2020

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This Summary for the Byelaw & Permitting Sub-Committee provides an overview of the background, methods and results contained within the Annual Review of the Live Wrasse Fishery in Devon and Severn IFCA's District (2017–2020), and discusses the implications of these results in the context of the management of this fishery.

Background

A fishery for the live capture of wrasse for use as cleaner fish in Scottish salmon farms developed in the Devon and Severn Inshore Fisheries and Conservation Authority's (D&S IFCA's) District in 2015. Management was introduced in 2017 via D&S IFCA's Potting Permit Byelaw. Since the management measures were first introduced, they have been regularly reviewed and adapted based on evidence derived from fishery observer surveys in D&S IFCA's District, particularly regarding catch per unit effort (CPUE: fish per pot) and landings per unit effort (LPUE: fish per pot within the Conservation Reference Size limits).

Methods

Key Message:

An updated approach to statistical analysis has provided greater understanding of environmental, geographic and fishery-related drivers of CPUE and LPUE.

Since the inception of the Live Wrasse Fishery in Plymouth Sound, D&S IFCA's officers have taken an increasingly robust statistical approach to analyses of CPUE and LPUE data. However, previous analyses have been unable to statistically control for variation in CPUE and LPUE that results from variation in environmental variables or location of fishing. Recent research by Henly *et al.* (in review) suggests that controlling for these factors is critical when assessing the sustainability of an inshore fishery; not doing so risks misattributing change to an effect of fishing, or not detecting a fishery effect that is masked by other variables.

Therefore, this Annual Review of the Live Wrasse Fishery in D&S IFCA's District (2017–2020) has used updated methods, adapted from Henly *et al.* (in review), in order to standardise monitoring data from D&S IFCA's fishery observer surveys using fishing locations and environmental data obtained from external sources. In doing so, this Annual Review identifies the main drivers of variation in CPUE and LPUE for the four target species of wrasse, and highlights considerations for management of the fishery.

D&S IFCA's Environment Officers completed observer surveys on approximately 6.3% of total fishing trips in 2020 (7 out of 111), despite the difficulties posed by the COVID-19 pandemic. The majority of the data analysis for this report is based on the data from observer surveys, as these provide the species-specific data that are required for a robust assessment of the fishery.

Results

Key Messages:

1) ballan wrasse CPUE and LPUE have declined, likely related to a higher proportion of the catch being retained.
2) rock cook CPUE and LPUE vary between locations across Plymouth Sound, but have not declined over the 2017–2020 study period.

The main drivers of variation in CPUE and LPUE differed between species. There was evidence of a decline in ballan wrasse CPUE and LPUE during the 2017–2020 period, particularly on the landward side of the breakwater. This decline over time is likely driven by the relatively high retention rate of ballan wrasse in combination with specific life history and behavioural characteristics that leave the species vulnerable to overfishing.

Using the fishing activity, fishing location and environmental data there was no evidence of a decline in rock cook CPUE or LPUE across the 2017–2020 period. Evidence of such a decline was highlighted in the Three Year Comprehensive Review of the Live Wrasse Fishery (Curtin *et al.*, 2020), and led to a prohibition on the removal of rock cook wrasse from the fishery. Curtin *et al.* (2020) used the best evidence available at the time, and a suitably precautionary approach was taken in reviewing the relevant management measures. However, the updated analyses presented in this report show that rock cook CPUE and LPUE vary significantly between broad-scale fishing areas (significantly lower in the more sheltered areas). The spatial distribution of fishing and survey effort has varied markedly over the 2017–2020 period, and in 2019 and 2020 the majority of the observer surveys were conducted in more sheltered locations. Previous research by D&S IFCA (e.g. Curtin *et al.,* 2020) was unable to account for this geographic variation in CPUE and LPUE, which was therefore interpreted in precautionary terms as a decline in rock cook over the 2017–2019 period.

Goldsinny wrasse showed seasonal and geographical variation in CPUE and LPUE that supports previous observations of goldsinny, and there was no evidence that these measures declined during the 2017–2020 period. Finally, there was a significant increase in corkwing wrasse CPUE across the 2017–2020 period. The change in corkwing CRS limits in 2018 has likely benefitted the species as a lower proportion of corkwing are being landed and mature individuals of each sex are likely being protected. There was also evidence of seasonal variation in corkwing CPUE and LPUE which may reflect the species' spawning season and concurrent activity levels.

Summary

Key Messages:

1) evidence supports a lifting of the prohibition on removal of rock cook from the fishery
2) ballan wrasse populations may be better supported by a change to the Conservation Reference Size limits for this species.
3) robust assessments of this fishery require species-level estimates of CPUE and LPUE from known locations, as provided by observer surveys, but are not improved by fishers' returns forms.
4) enhanced survey effort should ideally be distributed evenly across time and locations.

<u>Ballan CRS Review</u>

Key Message:

A revised CRS range of 18–22 cm would likely improve the sustainability of the ballan populations by increasing the proportion of mature females that are returned to the sea and can subsequently reproduce.

Under the current CRS limits of 15–23 cm, up to 71% of ballan caught in pots were retained during 2017–2020. As highlighted in the report, targeting this size range with high retention rates risks highly sex-selective fishing and removal of mature females from the population, potentially limiting reproductive potential and affecting population growth. The evidence is therefore in support of a review of the CRS limits for ballan wrasse. Scenarios of CRS changes have been presented below for context.

Table 1a shows the proportion of ballan below, within and above the current CRS limits (15 – 23 cm). Table 1b and 1c show, for comparison, these proportions under two hypothetical CRS change scenarios applied to the catches from 2017–2020: 18–23 cm and 18–22 cm. The latter allows for a much larger proportion of the catch to be returned to sea and, potentially, to subsequently breed. Based on previous research into the size at sexual maturity and sexual inversion in this sequentially hermaphroditic (sex-changing) species, it appears likely that increasing the minimum CRS from 15 cm to 18 cm would allow for a greater proportion of sexually mature females to remain in the population, while lowering the maximum CRS from 23 cm to 22 cm would increase the number of larger females (with greater reproductive potential) to be returned to the sea and contribute to population growth.

Table 1. *Proportion of ballan wrasse caught in Plymouth Sound in 2017–2020 that (a) are below, within and above the current CRS range (15–23 cm), and would be below, within and above the CRS range in two hypothetical CRS scenarios: (b) a hypothetical CRS range of 18–23 cm; (c) the recommended hypothetical CRS range of 18–22 cm.*

(a) *Current* CRS limits: 15–23 cm			
Year	**% Below**	**% Within**	**% Above**
2017	28.47	64.23	7.3
2018	20.73	57.32	21.95
2019	14.46	71.08	13.74
2020	12.37	71.14	16.49
(b) CRS *scenario* 1: 18–23 cm			
Year	**% Below**	**% Within**	**% Above**
2017	49.64	43.06	7.3
2018	34.15	43.90	21.95
2019	38.55	46.99	13.74
2020	22.68	60.83	16.49
(c) CRS scenario 2: 18–22 cm (recommended)			
Year	**% Below**	**% Within**	**% Above**
2017	49.64	35.03	15.33
2018	34.15	36.58	29.27
2019	38.55	43.38	18.07
2020	22.68	49.48	27.84

Changing the CRS range for ballan wrasse from the current 15–23 cm to a CRS range of 18–22 cm is predicted to result in lower future retention rates (e.g. Table 1a vs Table 1c). A review of the scientific literature, as presented in the full report, indicates that this will support the reproductive potential and population growth of this species.

Fishers' Returns Forms

Key Message:
Robust monitoring of the fishery relies on high quality observer surveys, which provide information that cannot be gained from fishers' returns forms.

Under paragraph 17 of the Potting Permit Byelaw, fishers are required to provide relevant fisheries information as requested by the Authority for the discharge of its functions. The Authority has previously requested the submission of weekly returns including information on the dates of hauling, location of strings, number of strings hauled, number of pots hauled, and the number of wrasse retained on board per day. Whilst these have been useful in aiding D&S IFCA's understanding of the spatial distribution of fishing effort in each year, recent analyses

have demonstrated that robust monitoring and management of this fishery requires species-specific data on catch and landings per unit effort, which are not available from these fishers' returns forms. Species-specific data are available from the observer surveys carried out by D&S IFCA's officers, which have provided a four-year dataset that is comparable with future data collected by observers. The data from the observer surveys have also provided the substantive material that forms the core of D&S IFCA's annual reports on the Live Wrasse Fishery.

The time- and resource-limited research capabilities of D&S IFCA (and the restrictions imposed by locations and timing of routine fishing activity), determine that future monitoring of this fishery should rely on observer survey data, and that future surveys should aim to distribute survey effort evenly and consistently over time and locations. This would allow for important species-specific drivers of CPUE and LPUE, identified here, to be accounted for in future analyses, enabling robust monitoring and recommendations for management.

Recommendations:

1. **Continue to manage the fishery as outlined in the D&S IFCA's Policy Statement and Potting Permit Conditions for the Live Wrasse Fishery (24th June 2020), except in the case of rock cook (2, below) and ballan wrasse (3, below), and except with regards to fishers returns forms (4, below).**

2. **Lift the prohibition on removal of rock cook from the fishery and reintroduce previous conservation reference size (CRS) limits of 12-23cm.**

3. **Change the ballan wrasse CRS range from 15–23 cm to 18–22 cm.**

4. **Remove the requirement for wrasse fishers to submit returns forms.**

References

Curtin, S., Henly, L. and Stewart, J.E. (2020). Three Year Comprehensive Review of the Live Wrasse Fishery in Devon and Severn IFCA's District. Devon and Severn Inshore Fisheries and Conservation Authority, Brixham, Devon.

Henly, L., Stewart, J.E. and Simpson, S.D. (in review). Drivers and implications of change in a multi-species inshore fishery.