

## **Current Research relating to the Live Wrasse Fisheries in the South West.**

Members of the D&S IFCA Authority requested information on the research being undertaken to investigate the potential impacts to the ecosystem of the removal of wrasse. At this time D&S IFCA officers are not able to undertake survey work to assess the ecological impacts of the fishery at this time, as this would involve a level of research equivalent to a full time PhD thesis. However, there is research taking place within the D&S IFCA District and along the SW coast, a summary of which is given below.

### **Devon & Severn IFCA**

Devon and Severn IFCA officers have been undertaken survey work and research for the 2018 Wrasse fishing season. This research has largely been investigating the landings and catches per unit effort to compare with last year fishery. It has also investigated the catch composition, spawning season and size distribution of the difference species of wrasse to evaluate if the D&S IFCA management measures are effective. The survey report will be published in November 2018.

### **Sarah Curtin D&S IFCA Environment Officer – MSc Research**

#### **Use of Underwater Video Surveillance to Investigate Trap Saturation and Catch Per Unit Effort in the Live Wrasse Fishery.**

##### **Abstract**

Fisheries catch per unit effort (CPUE) is regularly used to determine the status of many commercially important fisheries and is currently used within the live wrasse fishery to monitor local wrasse abundance. However, using relative abundance indices based on CPUE can be ambiguous as several factors such as trap saturation can affect catch rates. In this paper I investigate whether wrasse traps saturate and examine trends in CPUE since baseline. Underwater video was used to calculate the relative abundance indices MaxN, MeanN and MeanCount. These were compared to each other for the use of abundance estimates and assemblage composition between a control and fished location. Unfortunately, there was insufficient data to establish whether wrasse traps do saturate. CPUE showed no decline since baseline with no significant effect of month or year on abundance, assemblage composition or size. Location and relative abundance index had significant effects on abundance and assemblage composition with a significant interaction between both factors. In the fished area of Plymouth significant differences were detected between all video indices for relative abundance and assemblage composition. However only differences between MeanN and MeanCount were observed for Torbay. The relative abundance of wrasse based on the index MaxN was more than double in Plymouth than Torbay with location having a significant effect on abundance and assemblage composition. The use of underwater video in addition to trap surveys may therefore provide additional information that can be integrated into relative abundance indices to provide more accurate stock assessments and ultimately effective management measures.

##### **Conclusion**

In conclusion, although CPUE shows no consistent decline since baseline, these results should be interpreted with some caution. Raw CPUE can be misleading if not interpreted in context of other data and biological information. Although variation between the relative abundance indices is shown in this report, it highlights how the use of underwater video may be more appropriate, particularly for certain species, in the continual monitoring of the wrasse fishery. It is important to realise that no single methodology will efficiently collect all the information required about a fish stock. Therefore, integrating underwater video with trap survey data can provide information on a population that can be used to find inconsistencies in data and ultimately produce more accurate stock assessments. Continued monitoring of CPUE trends within the wrasse fishery is required to establish the causes behind any trends and determine whether further management measures are required. The completed thesis is available on request.

### **Lauren Henly PhD Research**

Lauren Henly is a PhD student funded by Natural England and Southampton University. The outline for her project is outlined below. Some of the data are being collected by the SW IFCAs, such as data from fishermen and some of the on-board survey work. Lauren is currently collecting fin clip samples for some population genetic analysis, which will hopefully provide a better understanding any population structure of wrasse on the south coast. With enough samples it might be possible to gain an idea of effective population size and home range sizes which could be very useful in further developing the management for the fishery. The focus of this work is Ballan wrasse and samples have been collected from Dorset, Devon and Cornwall.

Collection of wrasse for future analysis, by dissection, to identify the otoliths for age/growth analysis is being undertaken. Potentially some analysis of scales may be undertaken for similar data collection. The other major source of data from the dissections will be from the stomach contents, which will help gain some understanding of the wrasse feeding ecology and position in the food web. This might have to be done by stable isotope analysis or some form of DNA analysis as there are only a few hard body parts, which aren't easily identifiable.

### **PhD Aims:**

- To gain an understanding of the ecological function of wrasse by determining how important they are as both cleaners and mesopredators in their natural environment.
- To determine what the potential impacts of their removal may be on the environment and the rest of the reef community
- To determine a sustainable level of wrasse removal for the fisheries on the south coast of England
- To review whether the management strategies that are already in place can be improved

### **Objectives:**

#### **Establish knowledge base of wrasse (Chapter 1: Introduction)**

- History of the fishery
- Ecology (temp vs tropics) – what is the functional ecology of wrasse? What is the cleaning symbiosis?
- Sustainable fishing – what are the general principles (including metrics)? Relevant case studies, modelling approaches?

- Development of management (looking back, looking ahead)

### **Characterising the wrasse fishery on the south coast of the UK** (Chapter 2)

- Temporal trends in catch data (numbers, species, size, sex, spawning state)
- Spatial trends in catch data (numbers, species, size, sex, spawning state)
- Bycatch
- Comparison of fishing methods (behaviour, physiology, welfare, survival)
- Possible methods – Time series analysis, GIS, IFCA landings data, salmon farm data, on board surveys

### **Characterising wrasse populations in southern England** (Chapter 3)

- What is the distribution and abundance of wrasse on the south coast?
- Local scale patterns in distribution and abundance (habitat, sex, fishing, age)
- Is there population structuring within the region?
- How far do wrasse move at different life stages?
- Possible methods – Transects, SeaSearch, experimental fishing, commercial fishing, dissections/otolith analysis, molecular approaches, physical tags, dispersal modelling

### **To characterise the ecology of UK wrasse** (Chapter 4)

- **Describe the cleaning symbiosis of UK wrasse species**
  - Who are the clients?
  - What are the parasites?
  - How is the interaction initiated?
  - Differences to tropical?
  - Possible methods – Observation, video, gut contents, caged experiments
- **Characterise the trophic ecology of UK wrasse species**
  - What do they eat?
  - What eats them?
  - Importance of parasites in diet?
  - Importance of cheating in cleaning?
  - Possible methods - Observation, video, gut contents, caged experiments, EcoPath with EcoSim, stable isotopes
- **Explore reproductive biology of UK wrasse species**
  - Life history traits (length at maturity, age at maturity, sex ratio, social structure)
  - Timing of reproduction
  - Nesting behaviour
  - Possible methods - Observation, video, dissections, caged experiments, molecular markers

### **Applying gained knowledge to innovating sustainable management policy** (Chapter 5)

- Appraise current management strategies (successes and failures)
- Explore alternative management approaches (other case studies)
- Work with stakeholders to co-create better management
- To communicate recommendations
- To change management and improve sustainability
- Possible methods – literature review, workshop, outreach, monitoring

## General discussion, issues and solutions + the road ahead (Chapter 6)

### Milestones:

1. *Develop an understanding of the existing literature supporting the broad topics of the project, including:*
  - *The general ecology, biology and cleaning behaviour of wrasse species in the UK*
  - *The development and history of the live wrasse fishery in the UK and current management measures*
  - *The key aspects of a sustainable fishery, and potential impacts of continued removal of wrasse.*
2. *Engage with collaborators within Natural England, IFCAs (Cornwall, Devon and Severn, and Southern), CEFAS, Salmon farms, Wrasse fishermen and University of Exeter to define experimental plans addressing the objectives stated above.*
3. *Receive training in the various techniques required to develop the PhD plans, including wrasse sampling techniques, both through diving and on boat surveys, identification of UK fish species.*

### Current PhD Progress

- Literature review ongoing - History and development of the live wrasse fishery and management on the south coast of the UK – possible impacts/what is needed to ensure a fishery is sustainable/highlighting knowledge gaps.
- Collection of fisheries data –
  - TRAINING survey day with Cornwall IFCA on their dedicated survey vessel – (learnt wrasse ID techniques, handling gear, survey recording, practiced fin clipping techniques)
  - from fishery catch return forms (submitted to IFCAs) and
  - on-board observer surveys (multiple surveys completed – relationships being built with fishermen/salmon farms/fishing coordinators ready for next fishing season)
- Collection of fin clips for population genetics
  - Developed a sampling kit + instructions to give to fishermen to take fin clips from wrasse they are catching
  - Collected fin clips during on-board observer surveys >400 collected so far (mainly from Dorset – sampling trips planned with Cornwall IFCA, hoping to collect some fin clips from Devon)
  - Collaborating with Cefas – they have agreed to collect fin clips from any wrasse they process
- In-situ observations and surveys of wrasse behaviour/abundance
  - Refresher dives with university SCUBA club (EUSAC)
  - Completed SeaSearch Observer course – to understand
  - their data collection protocol and evaluate the potential for using SeaSearch data for abundance/locations of wrasse along the south coast
  - Dives with EUSAC – observing/photographing/videoing wrasse behaviours to develop ideas for future surveys
  - Snorkelling surveys/observations – searching for ‘cleaning stations’, exploring recommended sites
- Wrasse dissections

- Developed a dissection protocol
- Collaborating with Cefas – sharing dissection data/storing samples
- Offer of regular fish donations for studies on age/growth/maturation/stomach contents
- Training + demonstrating
  - STCW Personal Survival Techniques
  - First aid at work
  - Cornwall IFCA survey vessel
  - Undergraduate fish forensics practical
  - Wrasse dissections with Cefas
  - Undergraduate sustainable fisheries day
  - SCUBA refresher dives with EUSAC
  - SeaSearch Observer course
  - EwE software course (Nov 2018)
  - LTHE Stage 1 (Sept 2018) Stage 2 (Oct 2018)
- Conferences
  - South West Marine Ecosystems conference (April 2018)
  - Presented posters at MBA Postgrad conference 2018 and Society of Experimental Biology Conference 2018
  - Presenting poster at CLESCon 2018

### **Cornwall IFCA Research**

Within the Cornwall IFCA's District there are two salmon farms being supplied with wrasse by fishermen. This year's fishery in Cornwall for the salmon farm that only requires Ballan wrasse has now finished (23<sup>rd</sup> October 2018). On-board surveys by CIFCA officers to analyse catches has continued but at much reduced effort compared to 2017. Unfortunately, resources within CIFCA did not allow the level of effort for on-board catch surveys to be as high for a second year.

Initially CIFCA officers were able to use 6 strings of 10 pots each, supplied by one of the fishermen, to do some mark and recapture tagging research in an unfished area of the CIFCA's District. All retained individuals of all species, apart from Cuckoo wrasse, were tagged. The initial recapture work was undertaken at 48 hrs soak time after tagging to match the normal soak time. However, this first attempt resulted in a very low recapture and there were concerns that there may have been sampling bias on the individual behaviour, therefore officers have left five to six weeks to attempt the secondary recapture survey work. CIFA continues to liaise with Lauren Henley regarding the collection of Ballan fin clips, and she has supplied kit to IFCA officers to collect samples for her. Towards the end of October 2018 CIFCA officers have undertaken a second round of the recapture surveying to try an increase the total recaptured and now have the use of 16 strings of 10 pots until the weather makes survey work prohibitive. They have tagged approximately 1000 wrasse in a range of habitats in both fished and unfished areas, with the 160 pots hauled. The aim is to make some very broad scale estimates of relative abundance to habitat. At this stage uncertainties exist in the data and therefore the possibilities of natural mortality/ migration/ movement will not be included in the modelling work.

The catch and retention trend for CIFCA fishermen for the year appears to be reduced, however in recent days the biggest catches ever sampled on a catch sampling trip of c.1340 wrasse with c.12% of total being Ballan were recorded. Composition trends in a fished area are maintaining, however detailed analysis of the data is currently underway, and the size distribution of the catches will be investigated. The apparently downward trend in landings may be as a result of the slow start to the fishery due to atypical water temperatures until May and there was a reduction in effort by some fishermen who went over to crab whilst the crab prices were good. The salmon farm also had a 6-7 week period of not requiring wrasse for the farms.

CIFCA Members supported the proposed Byelaw for the Wrasse Fishery in September 2018 and the Byelaw has been quality assured by the MMO and is now with Defra for consideration. The CIFCA Byelaw will limit the number of vessel taking part in the Wrasse Fishery within the CIFCA District. Only two of the vessels that take part in the Devon Live Wrasse Fishery will be granted permits, under the qualifying period for this new Byelaw, to fish for Wrasse in the CIFCA district.