



May 2015

Here in Wales we are fortunate to have some of the most helpful fishers that are dedicated to the science and have a sincere commitment to a sustainable fishing future. These fishermen have helped us with our research over the past two and a half years and we definitely could not have achieved as much as we have without their help. Working on this project has been an inspiration and we are so grateful to have worked with you all.

It is now coming to an end and we would like to extend our warmest thanks to all those that have been involved with our work, from collaborating and helping us collect the data, to processing and analysing it.

Now that our funding has ended the project's research team will be taking on new roles in Wales, America, Australia, Kenya and elsewhere. But we hope to be able to continue our fisheries research in Wales in the future and hope to be able to work with many of you again.

All the reports we have produced will be available on our website: <http://fisheries-conservation.bangor.ac.uk/>

This is our last project newsletter and provides a summary of our research and the reports produced for each target species.



From left to right: Ian McCarthy, Michel Kaiser, Natalie & Tomos Hold, Jan Hiddink, Giulia Cambiè, Lee Murray, Julia Pantin, Jack Emmerson, Gwladys Lambert, Harriet Salomonsen, Jodie Haig, Katy Moorhead, Georgia Robson



On-board camera

An on-board camera system was developed with lobster and crab fishermen around Wales. This captures footage of the whole catch, both landed and undersized, and the video is analysed to gather size, sex and abundance data which will form the basis of stock status assessment and can be used to derive a recruitment index. To meet the requirements for the Marine Strategy Framework Directive (MSFD) and the reformed Common Fisheries Policy (CFP), improved data collection at a reduced cost is important. This camera system allows basic species data to be collected without the extra cost and logistics of an on-board observer.

A paper has been published and the abstract is available on our website

Abstract available:

- Hold, N., Murray, L.G., Pantin, J.R., Haig, J.A., Hinz, H., Kaiser, M. J. (2013). Video capture of crustacean fisheries data as an alternative to on-board observers. *ICES Journal of Marine Science*, 70, 1439–1450.

European lobster – *Homarus gammarus*

After 76 days at sea we have collected data on roughly 5000 lobster. This includes data on the size distribution, sex ratio and size at maturity. We have tagged over 1500 lobsters to look at movement and growth. We have collected egg samples from 95 females to look at egg quality and fecundity and collected egg and tissue samples from a further 200 lobsters for genetic analysis.

Many thanks to all the fishers involved in this work, particularly Jono Voyce and Sion Williams who let us join them for many hours at sea. Thanks as well to all those that helped collect and analyse the data.

There will be several reports available soon on the following:

- Lobster fecundity and egg quality
- Lobster size and maturity
- Lobster population demographics



Brown crab – *Cancer pagurus*

With limited data for Welsh populations, this work aimed to fill vital knowledge gaps and develop methods to enable long-term monitoring and pan-Wales stock assessments for this species. We investigated juvenile habitat preference and recruitment, and size at maturity and fecundity of brown crab. The size at maturity study involved researchers from the UK and surrounding countries to create the first collaboration of this kind. The results will inform appropriate minimum landing sizes and provide valuable data for stock assessments.

A huge thanks to all the fishers involved in all aspects of this sampling who have shown a continued commitment to achieving the high quality of science output. Thanks to all research assistants, volunteers, and students involved. Also thanks go to those who collaborated on the crab size at maturity project:

- Matthew Coleman, Kate Walker & Michael Bell, ICIT, Heriot-Watt University, Orkney campus,
- Michael Roach & Mike Cohen, Hull University and Holderness Fishing Industry Group, Yorkshire, England.
- Oliver Tully, Marine Institute, Galway, Ireland.
- Isobel Bloor, Bangor University, Isle of Man
- Snorre Bakke, Møreforskning, Norway

Brown crab reports available/upcoming:

- Investigating the abundance, distribution and habitat use of juvenile *Cancer pagurus* (L.) in the intertidal zone around Anglesey and the Llyn Peninsula, North Wales (UK). MSc thesis
- Size at maturity of *Cancer pagurus* in Welsh waters
- Fecundity of *Cancer pagurus* in Welsh waters; a comparison with published literature





Escape Hatch Study in Cardigan Bay

This study investigated the use of escape hatches in the Cardigan Bay lobster and crab fisheries, in collaboration with the CBFA. The study looked at two sizes of escape hatch, quantifying the bycatch, target species and changes in the size distribution of the species retained by the gear. The study also assessed the effect of escape hatches on sorting time and economic performance. A report of the findings has been completed and is available on our website.

Thank you to the fishers who provided the data and are continuing to collect additional data for this study.

Report available:

- Escape Gap Study in Cardigan Bay: consequences of using lobster escape gaps. A Preliminary Report

Prawn – *Palaemon serratus*

The prawn recruitment and fisheries samples collected in and around Cardigan Bay over the past eighteen months have now been processed and analysed. The results from this work will help to inform the management of the prawn fishery, and the final 'Cardigan Bay *Palaemon serratus* fishery' report will be made available online in the coming days. These results, along with the *Palaemon serratus* literature review, have formed the basis of a pre-assessment against Marine Stewardship Council (MSC) criteria, carried out on behalf of the Cardigan Bay Fisherman's Association (CBFA).

A huge thank you to all of the prawn fishers that have been involved in the project, and kindly volunteered their time to provide us with pot samples, participated in questionnaires and allowed us to conduct on-board observations. Thank you also to the CBFA, and all of the research assistants involved in the project. Jodie will be returning home to Australia, but will remain in contact with the Bangor team and be available for any future enquiries. Following on from their time in Aberystwyth, Georgia will be pursuing a fisheries internship with the Food and Agricultural Organisation (FAO), based in Nairobi, while Jack will take up a post as a shellfish researcher in Orkney, working for Orkney Sustainable Fisheries.

Prawn reports available/upcoming:

- The Common Prawn (*Palaemon serratus*) Literature Review
- Cardigan Bay *Palaemon serratus* fishery report 2013-2014
- Variations in the abundance and spatial distribution of *Palaemon serratus* (Decapoda: Palaemonidae) in the littoral Zone of South Wales. MSc thesis
- Cardigan Bay *Palaemon serratus* fishery report 2015



Juvenile crustacean survey

Over the last two years we have been designing a methodology to catch juvenile brown crab and lobster. The aim was to develop a method successful enough to use the data to find a recruitment index for the fisheries. The main findings focused on habitat preference.

Special thanks to Fisher Brett Garner on the Llŷn Peninsula who has put up with us on his boat measuring juvenile crabs and lobsters for over two years and has taken part in other projects (e.g. habitat mapping) as well. We are very grateful for the time, and tea and cake you have provided!

Reports available:

- Juvenile crustacean habitat survey report - Dec 13
- Abundance of juvenile *Cancer pagurus* and *Homarus gammarus* in different habitats



Whelk – *Buccinum undatum*

Jodie Haig has worked with Whelk fishermen between Swansea and Anglesey to assess the size frequency, sex ratio, maturity and other biological parameters of whelks and how that changes regionally. Fisheries data has also been collected looking at catch per unit effort (CPUE), by catch and length frequencies. The samples have now been processed and analysed.

Thanks to all those fishers, students and volunteers who helped collect and process these smelly samples. An extra special thank you to Peter & Stuart Jones on the Llŷn and Nigel Sanders* in Swansea for reliable whelk samples with complete and detailed datasheets month on month (and they were happy to help out our masters students all summer as well). *Nigel and his crew helped us tag over 12,000 whelks in four days!

Whelk reports available/upcoming:

- The size at maturity for the common whelk, *Buccinum undatum*, in Welsh waters, with an industry perspective on minimum landing sizes
- Determination of the abundance and population structure of *Buccinum undatum* in North Wales. MSc thesis - Turtle, October 2014
- The distribution, abundance and movement of the adult whelk *Buccinum undatum* (L. 1758) in South Wales, UK. MSc thesis - Robson, October 2014

King scallop - *Pecten maximus*

Fishing intensity experiment

We conducted a fishing experiment in Cardigan Bay to help establish what fishing intensities might be acceptable and environmentally sustainable for the Cardigan Bay SAC area. The main outcome of this study was to inform the scallop industry of their impact on the seabed in the Cardigan Bay SAC and help them, together with the Welsh Government, decide on acceptable levels of fishing based on direct environmental impact and resilience of the area. All the data is now collected and the majority of the analysis has been completed and will be available on our website shortly.

We thank all the fishers involved, on-board observers, volunteers, students and research assistants for their help in undertaking this exciting research.

Fishing intensity trial reports available/upcoming:

- Habitat assessment of the area of the Cardigan Bay SAC proposed for a fishing intensity experiment
- Impact of scallop dredging on benthic communities and habitat features in the Cardigan Bay Special Area of Conservation - Part I – Impact on infaunal invertebrates
- Impact of scallop dredging on benthic communities and habitat features in the Cardigan Bay Special Area of Conservation - Part II – Impact on the physical seabed
- Impact of scallop dredging on benthic communities and habitat features in the Cardigan Bay Special Area of Conservation - Part III – Impact on epifauna communities

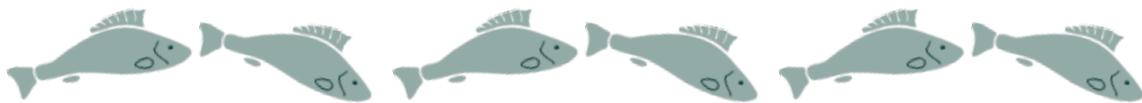
Scallop stock assessment

All the information collected on Welsh scallop abundance, biomass, size, age and maturity, as well as information on by catches, has been processed and an extensive report comparing data from 2012 and 2013 has been produced. This will hopefully be the beginning of a very useful time series which will allow us to assess the status of the stock available to the fishery and provide the invaluable evidence needed for the Welsh industry and the Welsh Government to discuss sustainable management plans in the future where and if needed.

Many thanks again to all those involved in the surveys, sample processing and analysis.

Scallop reports available/upcoming:

- Welsh waters scallop survey June 2012
- Taxonomic and functional recovery of epifauna after the permanent closure of an area of the Cardigan Bay Special Area of Conservation (SAC), Wales, to a scallop dredge fishery. MSc thesis
- Welsh waters scallop survey July-August 2013
- Status of scallop populations in Welsh waters - Results of 3 years of research surveys 2012-2014
- Connectivity between Populations of the Scallop *Pecten maximus* in the Irish Sea and the Implications for Fisheries Management. MSc thesis
- The spawning of King scallop, *Pecten maximus*, in Welsh waters – A preliminary study
- Scallop genetics and connectivity
- Scallop reproductive genetics



European sea bass – *Dicentrarchus labrax*

Over the past 2.5 years we have been collecting data on the population dynamics of the European sea bass in Welsh waters. We have collected data on the recruitment of juvenile bass, bass maturity, male:female ratio, size at age and migration patterns and connectivity. The data has now been analysed and processed. The results from this work will help to inform the future management of the bass fishery in Wales.

We could not have collected and processed all these samples without the help of many. Thanks to all the fishers involved. Thanks to the processing industries who allowed us to come and measure the bass and collect samples, particularly to Welsh Seafoods Ltd. in Milford Haven and Mermaid Seafoods in Llandudno. Thanks to all the research assistants, volunteers, and students and to John Lancaster at Swansea University.

Sea bass reports available/upcoming:

- Size distribution of the European sea bass (*Dicentrarchus labrax*) caught around Welsh waters. Preliminary results of the first sampling months (May-August 2013)
- European sea bass (*Dicentrarchus labrax*) exploited around Welsh waters -preliminary results: December 2013
- Population dynamics of the European sea bass (*Dicentrarchus labrax*) around Welsh waters and management implications
- Population dynamics of the European sea bass (*Dicentrarchus labrax*) in Welsh waters. MSc thesis - October 2014



Thornback ray – *Raja clavata*

We have analysed 88 thornback rays from North Wales, looking at the age, length, maturity and sex ratio. A short will be available on our website.

Report available/upcoming:

- The size at maturity of thornback ray, *Raja clavata*, in North Wales

Economic questionnaire

The economic questionnaire was designed to investigate the economic performance of the main segments of the Welsh fishing fleet and to look at the different fishing strategies. Indicators of the economic performance of fishing vessels and the knowledge of their fishing strategies are useful tools for improving management strategies and are necessary for the implementation of the ecosystem approach to fisheries management. Data on the technical characteristics (detail of boats and gear), landings and economic performance of 56 fishing vessels were collected from interviews with vessel owners between July and December 2013. This has now been analysed and a report is available.

We would like to thank all the fishers that have given up their time to answer our many questions to complete the interviews.

Report available:

- Economic performance and fishing strategies of the Welsh coastal fleet. Report No. 43 - March 2015

Fishers' Knowledge Questionnaire

The questionnaire was developed to tap into the knowledge fishermen have regarding topics such as species distributions, nursery grounds and bait use to name a few. The questionnaire included a mapping exercise where both current and historical fishing areas were mapped and information pertaining to target species obtained. The information gathered highlights areas for future research whilst providing a better understanding of the spatial activity of fishing around Wales and the local ecology of target species.

Thank you to all fishers that gave up their time to participate in this questionnaire. Most of the results have now been analysed and the report is available on our website. A series of published papers will hopefully result from further in-depth analysis. Some of the results were presented at the Marine Biological Association conference in Belfast this May.

Congratulations to Huw Williams and Eddie Sinnott for winning the prize draw for participation in this study!

Report available:

- The Inshore Fisheries of Wales: a study based on fishers' ecological knowledge

