

The aim of the Marine Pathways Project is to:

‘Protect marine biodiversity in the UK and Ireland by managing key pathways by which marine invasive non-native species are introduced and spread.’

The marine pathways project work continues throughout Great Britain and Ireland, carried out by a wide range of project partners and contractors. Here are some updates on the subject of non-native species and on specific project components.

Chinese Mitten Crabs in the Dee – Study Update

Chinese mitten crabs are a highly aggressive invasive species with a catadromous life cycle. They were first confirmed in the UK in the River Thames in 1935 and had established by 1973. Chinese mitten crabs were first confirmed in the River Dee (River Dee and Bala Lake Special Area of Conservation) in 2006, which is designated for Atlantic Salmon, River Lamprey, Sea Lamprey and Otter. The proportion of mitten crab megalopae in the river was studied to better understand population dynamics. Biochemical assays on the adults were also conducted to gain a better understanding of their energy reserves while undertaking downstream migration to their spawning grounds. No Chinese mitten crab megalopae were detected, demonstrating that, in the two sites where the collectors were placed, there were probably few mitten crab larvae. Many megalopae of different species were detected however, implying that the methodology was reliable.

Analysis of 55 mitten crabs were undertaken to detect lipid levels in the gonads and hepatopancreas and carbohydrate levels in the third walking leg muscles and to determine sexual maturity. When compared with values in the literature the lipid levels in the gonads of the females were relatively low, however the lipid levels in the males were normal. Lipids are essential for larval survival; low larval survival due to decreased lipid content could be one of the reasons affecting the apparent lack of Chinese mitten crab megalopae in the area sampled. The carbohydrate levels found were also low when compared with other species, implying that the adults do not feed during their downstream migration instead using their carbohydrate stores for energy. All but 4 of the 55 individual Mitten crabs were sexually mature helping to reinforce the idea that the majority of the crabs caught were actively migrating and not simply living and foraging in the area captured.



The investigation and data collected under the current project, as well as data collected as part of the wider Dee Chinese mitten crab project, has helped to gather more information related to the life history strategy and population dynamics of this species on the Dee River and estuary. This will provide useful insights for future work and help us to understand more about the invasive potential of this species and possible mitigation techniques. *(Text and photo by Ben Wray (NRW) and Kate Cooper (Bangor University))*

Marine pathways Project – the student experience (by Martina O’Brien, University College Dublin)

My involvement in the marine pathways project has been an extremely positive experience from start to finish. My work with Grainne O’Brien from Bord Iascaigh Mhara (the Irish Sea Fisheries Bord) introduced me to the project and the support I received from B.I.M for my research allowed me to actively contribute towards it. I took part in a knowledge transfer visit to the offices of Natural Resource Wales in November 2014 facilitated by Maggie Hatton-Ellis and Gabrielle Wyn.

Definitions:

Invasive non-native species (INNS):

‘A species which has been introduced outside its natural, past or present distribution and has a negative environmental, economic or social impact.’

Catadromous:

‘migrating down river to the sea to spawn.’

Case Species:

American Oyster Drill
(Urosalpinx cinerea)



(A live specimen of *Urosalpinx cinerea* in San Francisco Bay. Photo taken by Andrew N Cohen, Centre for Research on Aquatic Bioinvasions).

Native range:

North America.

Impacts:

- Preys heavily on native oysters and therefore is significant pest to the commercial oyster industry.
- May also compete with native molluscs.

Maggie and Gabe explained the marine pathways project and the actions being taken by organisations across the UK, to manage invasive species in marine ecosystems. I gave a presentation sharing my research on *Didemnum vexillum* with NRW staff and I gained insightful feedback and suggestions for future work. Kate Griffiths, Mathilde Bue and Stuart Jenkins from Bangor University gave me a tour of their lab facilities and we took a trip to an oyster farm in the Menai Strait. I was able to see their innovative inshore monitoring research being carried out through the clever use of existing artificial structures. Their research is definitely a step in the right direction for identifying effective monitoring techniques for INNS, to enable rapid response to the arrival of these species. I visited Holyhead Marina with Rohan Holt and Rowland Sharp. They talked to me about the eradication programme carried out there and the strategies and methods that have been developed and implemented to control *Didemnum*.

Paul Stebbing, from CEFAS, offered me a place on board the CEFAS research vessel, Endeavour. The 5 day cruise with CEFAS staff was a unique learning experience and not at all what I expected. My 12 - 4 am watch, which to my relief was a shift of lab work (rather than spotting icebergs!) introduced me to a range of different techniques used to collect and analyse water samples as they were taken during the cruise. Throughout the cruise we made stops to retrieve and redeploy remote sensing equipment used to record environmental parameters at stations in the North Sea, the English Channel, the Celtic Sea and the Irish Sea. The Smart Buoys and their use as offshore monitoring tools for invasive species were of particular interest to me. I helped Dave Sivyer and Anthony Barker with the final collection of settlement plates attached to the buoys and saw the specimens that had recruited on to the plates over a 6 week period. We arrived into Swansea late on our final day of the cruise and the next morning I travelled from there to the Marine Pathways Project conference in Cardiff. I thought that this was a particularly beneficial day, bringing together people working and researching invasive species alongside stakeholders. This conference provided a space for the sharing of ideas and a forum where we could work together to identify the actions and steps that need to be taken.



The marine pathways project has afforded me opportunities that have enriched my PhD experience and contributed towards my greater understanding of the efforts being made throughout the U.K. and Ireland to manage invasive species in marine ecosystems. It also emphasised the importance of collaborative links between the UK and Ireland to allow information to be shared and enable a co-ordinated approach to the management of invasive species.

Marine pathways Project - what next?

The Marine Pathways Project was originally a two year project funded until end of March 2015. However due to its success and the need for further work in the area of marine INNS the aim is for the project to continue. Continuation will likely be funded by small contributions from multiple sources for individual pieces of work to be undertaken by different organisations which make up the project team. Though the exact path of the project is flexible, we aim to continue to deliver and coordinate work on marine INNS in line with the marine strategy framework directive (MSFD) and the EU Invasive Alien Species regulations, providing support and advice to UK administrations, with close links to colleagues in the Republic of Ireland. In addition we will endeavor to maintain and build on links and relationships already established between team members and with important stakeholders. We look forward to the future of the project and encourage anyone interested in marine INNS to get in touch with the project team and welcome suggestions on where the future of the project should be focused.

For further information on the Marine Pathways Project please following the link to our web pages hosted on the Non-Native Species Secretariat website: www.nonnativespecies.org/projects/marinepathways

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