

Institution: University of the Highlands and Islands (UHI)		
Unit of Assessment: 7		
Title of case study: Studies in support of Nephrops Landing Obligation		
Period when the underpinning research was undertaken: 2015-2018		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Dr Clive Fox	Role(s) (e.g. job title): Senior lecturer fisheries ecology	Period(s) employed by submitting HEI: 2007 onwards
Period when the claimed impact occurred: October 2018 – December 31 2020		
Is this case study continued from a case study submitted in 2014? No		
<p>1. Summary of the impact</p> <p>Fishers traditionally throw unwanted catch back into the sea, a process known as discarding. Concerns over this practice have led to new rules under the European Unions (EU)'s Common Fisheries Policy aimed at forcing fishers to land all of their catch unless they can demonstrate "high survivability" of what they plan to discard. This landing obligation presents a challenge for fishers of Dublin Bay prawns – also called langoustine or <i>Nephrops norvegicus</i> – because they would need to pay the storage and disposal costs for animals too small to be worth retaining. It is also believed by the industry that most of the small prawns returned to the sea do actually survive.</p> <p>Collaborative research between the University of the Highlands & Islands (UHI), the University of Stirling, Centre for Environment Fisheries and Aquaculture Science (Cefas) and the Swedish University of Agricultural Sciences has confirmed that at least half of the undersized prawns discarded survive once returned to the sea. This led the European Fisheries Commission to grant "high-survivability exemptions", allowing Dublin Bay prawn fishers operating in the Scottish west coast waters, North Sea and Skagerrak to continue discarding small <i>Nephrops</i> under the new landing obligation. Based on 2018 landings data from the International Council for the Exploration of the Sea (ICES), 80% of the total European catches of <i>Nephrops</i> come from the waters covered by these derogations (West Scotland, North Sea and Skagerrak) which were granted in response to the research described in this case study. Of these landings, 63% was caught by UK vessels with the remainder being caught mainly by Danish, Swedish, French, Netherlands, Belgium and German vessels. These derogations have saved an estimated £1.6 million each year across the UK fleet of <i>Nephrops</i> trawlers with additional (un-quantified) savings to non-UK vessels. In addition to the economic impact, returning young prawns to their natural habitat reduces the additional mortality that would result if they were landed to port, helping the long-term sustainability of these stocks.</p>		
<p>2. Underpinning research</p> <p>The EU's landing obligation – otherwise known as the discard ban – is a contentious and high-profile issue for policy makers, the public, and the fishing industry. The obligation came into force for trawlers fishing off the West of Scotland and in the North Sea in 2018. It includes a number of legitimate exemptions (known as derogations), including for species that show high survival rates when returned to the sea. However, requests to the EU Commission for survivability exemptions must be based on robust scientific evidence and are evaluated on a case-by-case basis. If a derogation is granted it is written into the Discard Management Plan regulations for the relevant sea area.</p> <p>The limited number of previously published scientific studies on survival rates of prawns discarded from trawlers had produced highly variable results, partly because of differences in the way studies had been conducted. To improve the scientific robustness of such evidence, ICES produced a set of guidelines to standardize discard survivability experiments. These guidelines cover issues including: representative sampling, length of time observations should be conducted, and the use of control animals.</p>		

Working with colleagues from the University of Stirling, Fox started a research programme in 2015 to assess the survival of prawns discarded from trawlers fishing in the Clyde. Fox led the fieldwork and aquarium-based observations, while Albalat (Stirling University) applied crustacean biochemical and physiology expertise. The studies were supported by research assistants: Bruce, Collard and Coates (University of Stirling). This research showed short-term survival rates could be as high as 88% [3.1, 3.2]. This was an encouraging initial result, but the Clyde fishery does not represent the fishing conditions further offshore. In particular, the Clyde fishery collects animals for the live export market and thus focuses on using short duration tows to collect animals in good condition. Such high survival rates might therefore not be seen in trawlers fishing further offshore where tow durations are typically longer and where the catches are processed on-board and destined for the non-live market.

To tackle this, in the summer of 2016 and winter of 2017, Fox and his collaborators worked offshore on the prawn trawler 'Ocean Trust' to carry out further studies, following the ICES discard-survival measurement guidelines. Working in all weathers, they sampled over 3,000 discard-fraction prawns from the catches. These animals were then transported to the Scottish Association for Marine Science research aquarium where their survival rates were monitored over 13 days. The results showed that on average 55% survived [3.3], a level considered high enough by policy makers to meet the "high survival" threshold necessary to apply to the EC for an exemption from the landing obligation.

These research results were also of relevance to non-Scottish waters, as the team collaborated with scientists from the Centre for Environment, Fisheries and Aquaculture Science (Cefas, Lowestoft, UK) and the Swedish University of Agricultural Sciences to collate and analyse experimental prawn survival data from the Scottish studies alongside other studies conducted in the North Sea and the Skagerrak (which runs between the southeast coast of Norway, the west coast of Sweden, and the Jutland peninsula of Denmark). This combined analysis showed that all the results were similar, with mean survivals being 57% in the North Sea and 53% in the Skagerrak. The combined results and inter-study comparison have recently been published as an ICES Marine Science journal paper [3.4]. The consistency of these results between different fisheries further strengthened the evidence base for the application to the EU Fisheries Commission for a common survivability exemption to cover the west of Scotland, the North Sea, and the Skagerrak. This considerably widened the impact of the research conducted in Scottish waters to the broader geographical region (Scottish west coast, North Sea and Skagerrak), meaning that around 80% of the total European landings of *Nephrops* were covered by this research (based on landings statistics by country and sea area for 2018 from ICES).

3. References to the research

3.1 Albalat, A., McAdam, B. and Fox, C. (2015) Post-catch survivability of discarded under-sized Norway lobsters (*Nephrops norvegicus*): Towards a regional and ecosystems based approach. Fisheries Innovation Scotland Project 007, 64 pp. <https://fiscot.org/wp-content/uploads/2019/06/fis007.pdf>. This report was anonymously peer reviewed by a review panel appointed by Fisheries Innovation Scotland.

3.2 Albalat, A., Collard, A., Bruce, M., Coates, C.J. and Fox, C.J. (2016) Physiological condition, short-term survival, and predator avoidance behavior of discarded Norway lobsters (*Nephrops norvegicus*). J. Shellfish Res. 35, 1053-1065, [doi:10.2983/035.035.0428](https://doi.org/10.2983/035.035.0428).

3.3 Fox, C.J. and Albalat, A. (2018) Post-catch survivability of discarded Norway lobsters (*Nephrops norvegicus*): Further investigations within the large-scale fleet operation. ISBN: 978-1-911123-14-9, Fisheries Innovation Scotland Project 015, 219 pp. <https://fiscot.org/wp-content/uploads/2019/06/fis015-revised.pdf>. This report was anonymously peer reviewed by a panel appointed by Fisheries Innovation Scotland.

3.4 Fox, C.J., Albalat, A., Valentinsson, D., Nilsson, H.C., Armstrong, F., Randall, P. and Catchpole, T. (2020) Survival rates for *Nephrops* discarded from trawl fisheries. ICES Journal of Marine Science. 77,1698-1710. [doi:10.1093/icesjms/fsaa037](https://doi.org/10.1093/icesjms/fsaa037).

4. Details of the impact

The UK is the main country in Europe catching *Nephrops* and is responsible for 60% of the total landings, the remainder being caught (in declining importance) by vessels from Denmark, Ireland, France, Sweden, the Netherlands, Belgium, Germany, Norway, Spain and Portugal (based on 2018 landings data from ICES). Dublin Bay prawns are thus a particularly important fishery for the UK where they are caught by trawls and creels. Trawling accounts for the bulk of the landings at around 75% by value i.e. £60 – 75 million per annum (Marine Management Association UK Sea Fisheries statistics).

Recognising the importance of the prawn fisheries, Dr Fox organized a workshop in May 2014 that brought together a wide range of stakeholders, including fishery scientists, policy makers, industry representatives, and NGOs to discuss issues facing the sector. At the workshop, industry representatives expressed strong concerns about the impact of the EU landing obligation, which was due to be introduced over the next few years, and presented the case that post-discard survival of *Nephrops* was much higher than the 25% figure commonly assumed at the time by fishery bodies such as ICES.

4.1 Regulatory impact

Fox and Albalat's subsequent research confirmed that survival of *Nephrops* is, indeed, higher, typically more than 50%. The Scottish Government submitted the results from the UHI and Stirling Universities research as evidence to the EU Fisheries Commission in 2018. The Commission in turn asked its Scientific, Technical and Economic Committee for Fisheries (STECF) to review the evidence. An exemption was granted in 2018 on grounds of high survivability, ahead of the full implementation of the discard ban [5.4, 5.5]. In recommending approval for the exemption, STECF concluded: "The supporting scientific information is of good scientific quality and is based on state of the art methods ("as recommended by the ICES Working Group on Methods for Estimating Discard Survival") and "the approach chosen to try to validate how representative the captive survival estimates were of the wider fleets is commendable" [5.1, p139].

In February 2019, Paul McCarthy of Marine Scotland's Discards Team stated via the Fisheries Innovation Scotland's (FIS) project portfolio impact evaluation report [Anderson Solutions & O'Herlihy & Co Ltd confidential report to Fisheries Innovation Scotland mentioned in email 5.2] that: "The [UHI/Stirling] research [funded] from FIS was a key component of the case that Marine Scotland put forward to argue for a High Survival exemption for *Nephrops* caught in trawls in both the North Sea and North Western Waters. The research formed the evidence base on which we were able to show that more than 50% of discarded *Nephrops* did survive and were capable of contributing to the overall biomass. The complete [research] report was sent to STECF where it was reviewed. STECF assessed it as methodologically sound and its conclusions were considered convincing. Without the research we would not have been able to secure the *Nephrops* high survival exemptions." [5.2]

Broadening the geographic impact of the research, Fox and Albalat further collaborated with Cefas and the Swedish University of Agricultural Sciences in bringing together and comparing prawn survival data from the west of Scotland with North Sea studies. This inter-study comparison was recently published in the peer-reviewed scientific journal of the intergovernmental body ICES [3.4], further strengthening the evidence underpinning the survival exemptions for both sea areas.

Richard Holburn, Marine Scotland Policy Officer stated in Nov 2019: "The granting of this [*Nephrops* discarding] derogation was particularly useful for all those involved. By combining the

derogations into one [covering both the North Sea and North Western Waters] it made things simpler for stakeholders to follow and comply with, reducing the possibility of enforcement action and any confusion as to which derogation was being utilized at the time of inspection. The simplification also benefitted policy colleagues as it made negotiations simpler by referring to one exemption" [5.3, 5.4, 5.5].

4.2 Financial and other impacts on the industry

The UK industry estimates the exemption has saved it significant amounts of money and additional practical problems. Because the exemptions were granted, precise costs which would have been incurred in disposing of unwanted *Nephrops* in accordance with the landing obligation are not available, but a study by the government's Cefas body has estimated that the average costs across the industry of disposing of unwanted material which would have to be landed (without the derogations) would be £9,900 per fishing vessel per year [5.6 p24]. Disposal costs are particularly high because the waste must be stored separately from the human food-chain and disposed of in accordance with strict regulations. Storage and disposal costs for geographically remote landings ports, such as in the west of Scotland, would likely be even higher. Given that 164 UK prawn trawlers fish the waters where the exemptions apply (West Scotland and North Sea), there is an estimated saving of £1.6m per year across the entire UK fleet. Such additional costs would fall to the catching vessels and would have been difficult to bear, especially for smaller operators and those working in remote regions. The derogations will also have resulted in similar cost savings for other countries fishing in the North Sea in particular, but it has not been possible to find comparable waste disposal costs in order to estimate those additional savings outside of the UK.

Financial savings are in addition to the removal of operational difficulties mentioned above by Richard Holburn [5.3]. Furthermore, Ian Wightman, a small trawler operator in the Clyde and member of Clyde Fishermen's Federation, stated in January 2020: "The derogation has been a keystone in maintaining our ability to continue fishing unhindered. It has been fundamental in showing that our current methods are extremely selective and sustainable, it has helped to show certain groups that we do not catch a large amount of undersized stock. The project has stopped the realistic possibility of a large financial burden disposal of any catch. The mental burden of having to comply with unworkable burdens should not be underestimated."

4.3 Conservation benefits

There has been a conservation impact as well. UHI and Stirling Universities' research in the offshore fishery showed that trawlers typically discard up to 5,000 small *Nephrops* per day [3.3]. Assuming a trawler typically fishes for 200 days per year, under the terms of the survivability exemption, UK trawlers continue to return an estimated 260 million young prawns to the ocean each year. The research suggests that over half of these discarded animals survive, animals that otherwise would have been brought to port and killed un-necessarily. These young animals will continue to grow and contribute to the long-term sustainability of the stocks.

5. Sources to corroborate the impact

- 5.1 Bailey, N., Rihan, D. and Doerner H. (2018) *Reports of the Scientific, Technical and Economic Committee for Fisheries (STECF) - Evaluation of the landing obligation joint recommendations (STECF-18-06)*, European Commission: Publications Office of the European Union, Luxembourg. p. 223.
<https://stecf.jrc.ec.europa.eu/documents/43805/2124128/STECF+18-06+-+Evaluation+of+LO+joint+recommendations.pdf>
- 5.2 Email from Fisheries Innovation Scotland quoting Paul McCarthy (Marine Scotland)
- 5.3 Email from Richard Holburn, Marine Scotland

- 5.4 Commission Delegated Regulation (EU) 2018/2034 of 18 October 2018 *establishing a discard plan for certain demersal fisheries in North-Western waters for the period 2019-2021*. Article 3. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018R2034&from=EN>
- 5.5 Commission Delegated Regulation (EU) 2018/2035 of 18 October 2018 *specifying details of implementation of the landing obligation for certain demersal fisheries in the North Sea for the period 2019-2021*. Article 3. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018R2035&from=EN>
- 5.6 Mangi, S.C. and Catchpole, T.L. (2012) SR661 - Utilising discards not destined for human consumption in bulk uses. 51 pp. 978-1-906634-67-4.
https://www.seafish.org/media/Publications/SR661_Utilising_Discards_bulk_uses.pdf