Northern Ireland Fishing & Seafood Development Programme

Stage 1: Fishing

Final Report

February 2020

The Strategic Investment Board

Department of Agriculture, Environment and Rural Affairs
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Report Information

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Abbreviations used

ADG .....Ardglass Development Group
AFBI .....Agri-Food Biosciences Institute
AMO.....Atlantic Multidecadal Oscillation
ANIFPO Anglo-Northern Irish Fish Producers Organisation
CFP.....Common Fisheries Policy
CPUE.....Catch Per Unit Effort
DCF .....Data Collection Framework
DAERA .....Department for Agriculture, Environment & Rural Affairs (NI)
Defra .....Department for Environment, Food and Rural Affairs (UK)
DfE.....Department for the Economy
EU.....European Union
FAO .....Food & Agriculture Organisation (UN)
FSDP .....Fishing & Seafood Development Programme
FTE .....Full Time Equivalent
FUI .....Fuel Use Intensity
GHG.....Greenhouse Gases
GIS.....Geographical Information Systems
GN .....Gill Net
GND.....Gill Net Demersal
GNS .....Set Gill Nets
GT.....Gross Tonnage
GTR .....Trammel Net
GVA .....Gross Added Value
ICES .....International Council for the Exploration of the Sea
IFPG .....Inshore Fisheries Partnership Group
IMO .....International Maritime Organisation
IPCC .....Intergovernmental Panel on Climate Change
KSP.....Kilkeel Strategic Partnership
kW.....Kilo Watt
LWE .....Live Weight Equivalent
MAP .....Multi Annual Plan
MCS.....Monitoring, Control and Surveillance
MCZ.....Marine Conservation Zone
MMO .....Marine Management Organisation (UK)
MPA.....Marine Protected Area
MSFD.....Marine Strategy Framework Directive
MSY .....Maximum Sustainable Yield
NAO .....North Atlantic Oscillation
NIFHA .....Northern Ireland Fishery Harbour Authority
NIFPO .....Northern Ireland Fish Producers Organisation
NIGEAE .....Northern Ireland Guide to Expenditure Appraisal and Evaluation
NMDDC .....Newry Mourne & Down District Council
NPV .....Net Present Value
SNIAC .....Seafish Northern Ireland Advisory Committee
SPA.....Special Protected Area

SSCF .....Small Scale Coastal Fleet
SSSI.....Site of Special Scientific Interest
TAC.....Total Allowable Catch
TEV.....Total Economic Value
UK.....United Kingdom
VCU .....Vessel Capacity Unit
VMS .....Vessel Monitoring System

Executive Summary

Background

The Fishing and Seafood Development Programme (FSDP) is established in response to calls from the Northern Ireland (NI) fishing industry to make significant investments in fishing harbour infrastructure.

The FSDP will review the opportunities for developing the sea fishing and seafood sectors in NI as a whole, including the potential role of new public investment in infrastructure, and will make recommendations to the Departments. This requires a long-term view (25+ years) as port infrastructure is intended to have a long life span.

This Stage 1 report focuses on the current and future needs of Northern Ireland's fishing industry. Stage 2 of the FSDP will focus on post-harvest and shore-based sectors. Both will contribute to the FSDP, which is to be produced by June 2020 and will contain a comprehensive suite of recommended actions.

Economic context

The Northern Ireland economy continues to lag behind the rest of the UK in terms of GVA, productivity and wage levels. Since 2009 the UK's annual average growth rate has been around 1.2% compared to only 0.1% for Northern Ireland. The economic impacts resulting from recent problems with some large NI manufacturers highlight the importance of Northern Ireland's indigenous industries of farming and fishing, which are characterized by a large number of micro-enterprises and SMEs.

Northern Ireland's agri-food sector has grown substantially over the last 20 years. Seafood (making up 2.8% of export sales by the food and drink sector) has not experienced the same growth rates as some agri-food sectors such as beef, milk and poultry, but turnover of the Northern Ireland seafood industry grew to £99 million in 2018. The steady growth in value is based on relatively stable volumes of shellfish and demersal species landed into NI ports (pelagic species fluctuate more) and in recent years employment in catching, processing and marketing has seen a 10% increase.

The average volume of seafood landed into NI ports between 2006 and 2018 of around 22,000t, is a very similar level to landing into NI in the 1990's. The value of landings into NI ports fluctuates, but the overall trend is positive with the first-hand landed value exceeding £30 million in recent years.

The total catch by the NI fleet is far greater than the landings into NI ports, amounting to over 52,000t in 2018 with a first-hand sales value of over £57.5 million. The main reason for this difference is the NI pelagic fleet: three large vessels that land much of their catch to processors in Scotland, Ireland, Norway and Denmark. There are also landings by the demersal fleet to ports outside NI when fishing *Nephrops* in the Clyde (some of which returns to NI processors) or scallops around the Isle of Man.

Greater emphasis on conserving the marine environment will see additional spatial constraints placed on bottom fishing (trawl and dredge), which account for the majority of landed value. The displacement of fishing effort should be relatively localized and so would not have significant long-term impacts on the landed value into NI ports.

Brexit could benefit the NI seafood industry (a moderate increase in NI landings if the UK can negotiate a greater share of resources key to the NI sector, i.e. *Nephrops*), but there may be challenges related to the NI Protocol and its potential impacts on east - west movements of fish and fish products.

Climate change will bring challenges for the seafood industry with changes to species distributions over the long-term and in particular, the need to upgrade infrastructure to account for impacts from more extreme and frequent storm events and sea level rise.

The fleet

NI is characterized by a comparatively old fleet, which now numbers about 140 over 10m vessels (most trawling for Nephrops, landing whitefish as bycatch and with some scallop dredging); around 200 inshore vessels fishing crab and lobster; and a modern pelagic fleet of three large vessels over 50m in length fishing for mackerel, herring and other small pelagic species.

A growth in landings in the 1970's led to fleet expansion in the 80's and the fleet has since contracted to pre-expansion levels. The last 10 years has seen a slight reduction in demersal fleet capacity with fewer, but relatively larger and more powerful vessels, and growth in pelagic fleet capacity with upgrades to the three pelagic vessels.

Demersal (*Nephrops*/whitefish and scallop) vessels dominate the NI fleet. These are reducing in number, but landed volumes have not declined significantly and the landed value has increased over the last ten years. On average *Nephrops* trawlers have seen consistently positive, but fluctuating levels of operating profit that are most closely related to export prices. Even though this average economic performance is positive, some further fleet consolidation can be expected.

The issues facing the demersal sector are inter-related: a lack of investment in port infrastructure; limited investment by fishing operations; and an inability to attract crew and new entrants. Some NI licenses are being sold to Scottish fishing interests that are investing in larger vessels, often by skippers reaching retirement age without clear succession plans. Several old vessels have been abandoned in the fishing ports and the issues this causes to other harbour users will worsen unless 'End of Life' responsibilities are enforced and viable decommissioning facilities are available.

New vessels are getting larger and deeper to make them more efficient (in terms of fuel, fishing and catch handling); less weather dependent (more able to operate in adverse weather); and more comfortable (important for attracting and retaining crew). Many of the new vessels entering demersal fleets elsewhere, such as Scotland (traditionally the main second-hand market for NI), would face too many operational constraints to fish from NI's fishing ports. Without suitable replacements, NI's demersal fleet would become relatively less efficient and so less competitive than other demersal fleets.

The modern, three-vessel **pelagic** fleet is highly profitable: it has seen multimillion-pound investment and has no problem attracting and retaining local crew. These new vessels are already too large for the NIFHA ports, but two acting as a pair team land most of their catch (all herring and most mackerel) into Belfast for sale to NI processors. The largest vessel catches larger volumes as well as other species that are not sought by NI processors. It is processing capacity, not just port capacity that means most of its catch is landed into the major European pelagic ports.

The **Inshore** fleet is mainly a potting fleet using environmentally friendly static gear with relatively low operating costs. It is differentiated between the Down fleet (the great majority of the fleet) and the North Coast fleet (widely dispersed with a concentration of ten currently operating from Greencastle, Co. Donegal). After an increase between 2008-2013, vessel numbers have decreased to just below 200, with much of the fleet aggregating in a few ports, particularly Kilkeel and Ardglass where space for the inshore fleet is inadequate. New vessels designs such as catamarans are wider to give more deck

space for more efficient and safer operation; this requires more port space than older vessels. Management of the inshore target stocks is now receiving more attention, but action is urgently needed to address the recent effort increases that have resulted from high crab prices.

The fishing ports

The NI fleet has mostly consolidated into the 3 NIFHA fishing ports: Ardglass and Portavogie (both showing recent reductions in the over 10m fleet and increases in the inshore fleet) and Kilkeel (a stable over 10m fleet in recent years, but some reduction in inshore vessel numbers). The fleet sector facing the most significant operational constraints due to port capacity in the NIFHA ports is the demersal fleet. The largest fleet is based in Kilkeel which faces the greatest operational constraints.

Ardglass is home to two of NI's pelagic processors and has historically been the centre for pelagic landings. However, water depth and length of quayside prevents new pelagic vessels from landing in the harbour. Tankers deliver fish from the NI vessels landing in Belfast (an hour away) instead of tankers moving fish from quayside to factories. There is also inadequate provision for the growing inshore fleet.

Kilkeel has considerable constraints in access (water depth, weather and tidal) and overcrowding at the quayside. UK and Irish ports with comparable volumes and value of landings are not so constrained in terms of water depth & access. Nevertheless, there is substantial economic activity from numerous seafood & service businesses. Harbour capacity is constraining investment and growth in the fishing and associated maritime sectors. While the number of vessels may reduce somewhat in the future, the current port would still be limiting in terms of space, depth and access. Increased value to the NI economy could be achieved if seafood and servicing companies had the space to expand and so receive landings and vessels from the local fleet and beyond.

Portavogie has some depth constraints and a narrow entrance, but the fleet is reducing in number and overall there is adequate quayside space that is in reasonable repair. There is available space surrounding the harbour to enable an expansion of shore-based services.

Outside the NIFHA ports, the inshore fleet is sparsely distributed at various multi-use ports and landing points around Northern Ireland's coast. These assets are managed and maintained by the local authorities that tend to prioritise tourism, resulting in limited infrastructure provision for fishing.

NI ports that have greater capacity in terms of water depth (Belfast, Bangor, Lisnahally and Warrenpoint), face several other issues that would make it unfeasible for the NI demersal fleet to relocate, including the distance from key fishing grounds (other than Warrenpoint), available quayside space and that the stated strategic intent of all the ports is in targeting other economic sectors. See Appendices F and G for further analysis of port capacities.

Infrastructure needs

Any one of the NIFHA ports could be developed to reduce the operational constraints of the demersal fleet, creating wider benefits for the port concerned and for the sector. However, the creation of new port capacity would not necessarily result in the wholesale relocation of fleets as operators have many connections to their home ports, suggesting that specific targeted investments at the three NIFHA ports may best support NI seafood sector development.

A new, extended port at Kilkeel would minimise access constraints and to better integrate activities with other port users & the town as whole. A well-planned port development of sufficient size will enable

Kilkeel to develop as the Irish Sea Marine hub, supporting seafood and marine industrial services. The scales of potential port development at Kilkeel need to be clearly defined and costed, i.e. what would be required to accommodate the demersal, inshore and all or part of the pelagic fleet. A 'do nothing' scenario is not a no cost option: without a larger port, fishing and shore-based industries are stymied and will become less competitive than businesses in other UK & Irish ports.

Additional landings made by the largest pelagic vessel would add value, but this is only likely with increased processing capacity following the requisite expansion in port capacity. Additional economic activity from ancillary support services is likely with more capacity to receive vessels from the local fleet, elsewhere and potentially the pelagic vessels if facilities are of sufficient capacity.

The inshore fleet in Ardglass is poorly served and the introduction of pontoons (e.g. in the 'Sawpit' area) would alleviate over-crowding. A feasibility study into harbour development options, including the accommodation of larger pelagic vessels, is currently ongoing.

Portavogie has sufficient port space that could be maintained for the current and expected future Portavogie fleet. It has a slipway that could, with investment to upgrade, support the development of ancillary activities and there is space available (e.g. Parkgate site) for larger developments. This potential will be explored further in Stage 2.

Small scale infrastructure investment outside of the NIFHA ports is needed. The whole fishing industry must be able to access available funding, which should be included in FSDP support measures.

More information is needed and will be sought in Stage 2 work under the FSDP to ensure port development proposals to support the demersal fleet are fit for purpose and realistically costed.

Recommendations

This Stage 1 report focuses on the NI fishing fleet. The Stage 2 report will explore the wider seafood sector in Northern Ireland and other port-based users. Both will contribute to the Fishing and Seafood Development Programme that will contain a comprehensive suite of recommended actions. The recommendations below are made for earlier consideration and to further inform the FSDP:

1. Commission an 'Outline Design & Costing' study for an extension to Kilkeel Harbour, which would develop fully costed options to determine how much additional cost would be required to accommodate the demersal fleet and all or part of the of the pelagic fleet. The study should also take account of desire to improve safety, access, efficient vessel movements within the port and provision of adequate quayside & space for shore-side development.

2. Additional work to inform a decision to carry out detailed technical and environmental studies to develop Kilkeel.

   ⇒ Review of the outline business case for developing Kilkeel in the light of revised development options and costs

   ⇒ Review of the technical specifications for detailed technical and environmental studies at Kilkeel, to include the impact on sediment movement and possible mitigations.

3. Review the Ardglass feasibility study when available to inform an outline business case for developing Ardglass, prior to potential development of specifications for detailed technical and environmental studies.

1. Introduction

1.1 Background to the FSDP

The Fishing and Seafood Development Programme (FSDP) has been established in response to calls from the Northern Ireland (NI) fishing industry to make significant investments in fishing harbour infrastructure.

Before embarking on significant capital infrastructure investment DAERA recognised a need to carry out a strategic programme of work to explore the challenges and opportunities facing the NI fishing and seafood sectors. This work will help to shape long term plans to develop the Northern Ireland fishing and seafood sectors, including its infrastructure and enable the sectors to realise their full potential.

A long term view is needed for the FSDP as port infrastructure is intended to have a long time span. The Northern Ireland Guide to Expenditure Appraisal and Evaluation (NIGEAE) suggests at least a 25 year evaluation period, while HM Greenbook suggests that up to 60 years may be appropriate for such long-term infrastructure[1].

1.2 Objectives

The overall purpose of the Programme is to provide a substantive evidence base for the long-term planning of sea fishing and seafood development, including, catching and processing sectors, and associated infrastructure investment, taking account of the UKs transition into an independent coastal state. The output of the Programme will provide a sound basis for future decisions to be taken by NI Ministers.

The Programme will review the opportunities for developing the sea fishing and seafood sectors in NI as a whole, including the potential role of new public investment in infrastructure, and to make recommendations to the Departments.

1.3 Governance & Policy context

This stage 1 report is produced during two key future governance uncertainties:

(a) the relationship between the United Kingdom and the European Union

(b) the devolved administration of Northern Ireland

The Stage 1 findings in this report are presented notwithstanding the eventual status of Northern Ireland's governance or relationship with the EU, but the report clearly indicates where any findings are influenced by these situations and these will be reviewed in final reporting.

The following policies (and their key features) are identified as relevant to the Fishing and Seafood Development Programme:

[1] HM Greenbook "In some cases up to 60 years may be suitable, for example for buildings and infrastructure."

Table 1 UK and NI government relevant policies

Policy or plan	Key features
United Kingdom	
Fisheries Bill 2017-19	setting fisheries policy objectives after UK exit from the EU's Common Fisheries Policy
Climate Change Act 2008 (2050 Target Amendment) Order 2019	setting a net zero carbon target for the UK economy by 2050
Industrial Strategy, 2019	detailing how certain sectors will develop and achieve the net zero target
Northern Ireland	
Investment Strategy for Northern Ireland 2011-2021	setting out priorities for public sector investments
Marine Act (Northern Ireland), 2013	developing an NI Marine Plan and establishing inshore MPAs
NIFHA Corporate Plan 2018-2022	NIFHA actions, including minor works & capital spend
South East Coast Master Plan, 2013	including reference to Sustainable Kilkeel Vision 2020
Inshore Fisheries Strategy, 2014	forming Inshore Partnership Group, addressing data gaps

The Northern Ireland economy continues to lag behind the rest of the UK with a GVA per head of £21,172 compared to the UK average of £27,555 (ONS, 2019). Since 2009 the annual average growth rate has been around 1.2% in the UK compared to only 0.1% for Northern Ireland. NI also exhibits relatively low pay with 28% of workers earning less than the real living wage and productivity levels are low compared to the UK (Figure 1). The large drop seen in 2017 resulted from drops in production from NI major manufacturing companies such as the closure of JTI Gallaghers and Michelin. This highlights the strong reliance of the NI economy on a small number of large manufacturers, which represents a risk as demonstrated by recent developments at Wrightbus and Bombardier. It also highlights the importance of Northern Ireland's indigenous industries in farming and fishing, which are characterised by a large number of micro-enterprises and SMEs.

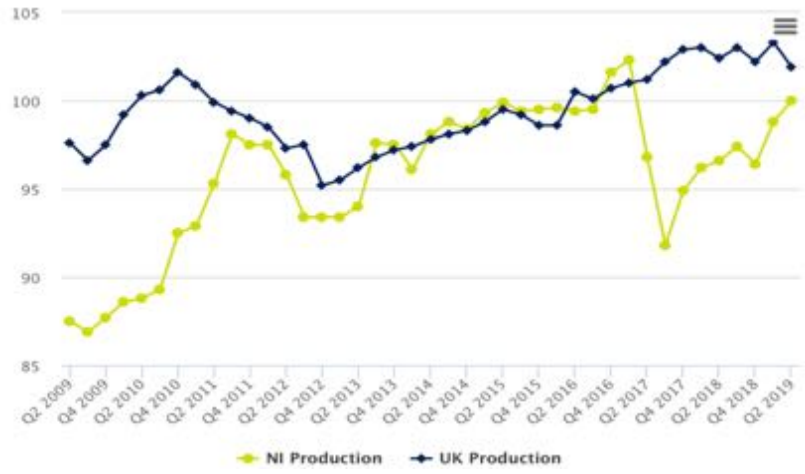


Figure 1 Index of Production for Northern Ireland and the UK 2009-2019. (source: NISRA, 2019)

In 2018 the NI food and drink processing sector accounted for 2.3% of GVA compared to 1.5% at a UK level. Fish is a relatively small sub-sector with just 2% of the total gross turnover, £99 million in 2018. The sector has recovered from the decreases during the 2006-08 economic crisis, but it has not shown the growth rates seen in other NI agrifood sectors (Figure 2). Seafood made up 2.8% of export sales by the food and drink sector and in recent years employment in catching, processing and marketing has grown from 1,733 in 2015 to 1,911 in 2018, a 10% increase (DAERA, 2019a).

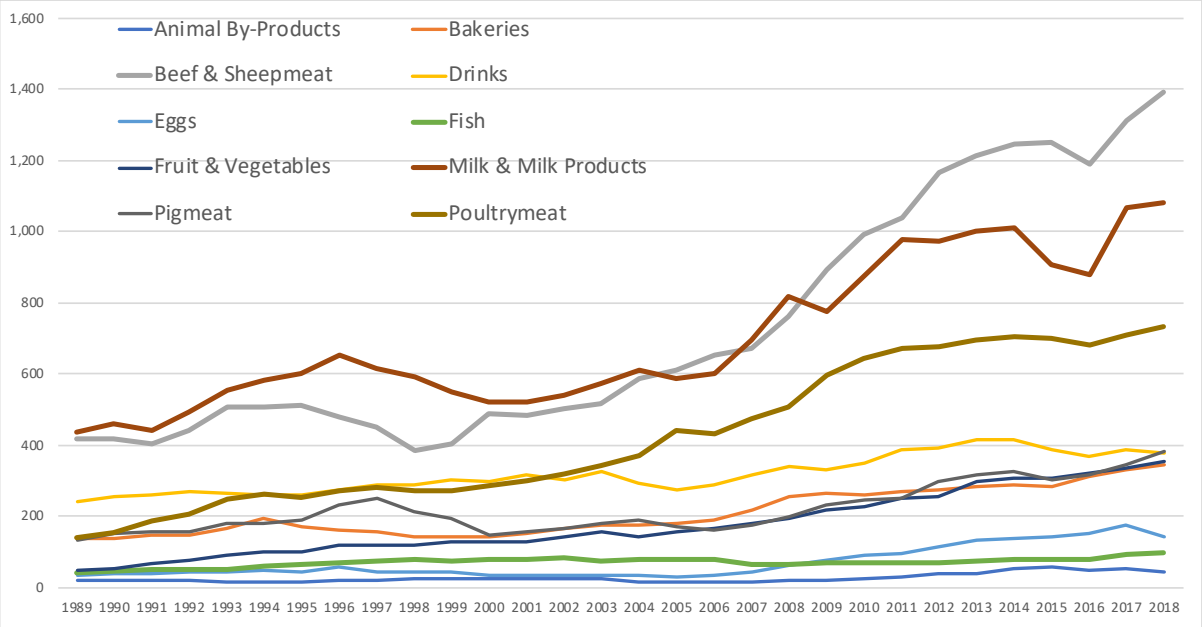


Figure 2 Gross Turnover (million £) in NI food and drink processing sectors 1989-2018 (source DAERA, 2019a)

Table 2 below shows the recovery by the fleet from challenging economic conditions ten years ago. The decrease in 15/16 is mostly the result of vessel replacement in the pelagic fleet disrupting activity over that fishing season.

Table 2 Economic performance and contribution to the economy by the NI fleet 2008-2016 (adjusted to 2017)

Indicator (million £)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gross Value Added	16.94	13.36	15.27	29.02	29.35	23.23	31.58	24.97	22.17
Operation Profit	6.49	5.31	6.60	14.83	15.68	11.61	17.15	12.46	10.86
Net profit	3.79	2.51	4.02	11.05	12.41	7.37	13.4	8.43	8.55

Source: Seafish (evidence provided to House of Commons, 2018)

1.4 The Marine Environment

The future management of the marine environment has implications for the NI fishing fleet: it will restrict some fishing practices that damage certain habitats and, less directly, a healthier marine environment should lead to fisheries benefits as part of a well-functioning ecosystem.

The UK exit from the EU means that it is no longer tied to the EU regulatory framework, but the UK government has committed to retaining the marine conservation objectives that were set out in UK

legislation such as the Marine and Coastal Access Act (2009) and the Marine Strategy Regulations (2010). In 2018 the UK government published 'A Green Future: Our 25 year plan to Improve the Environment' which included marine objectives to reverse the loss of marine biodiversity and, where practicable, restoring it; increase the proportion of protected and well-managed seas, better manage existing protected sites; and ensure seafloor habitats are productive and sufficiently extensive to support healthy, sustainable ecosystems. In terms of resource use the plan has objectives to ensure that all fish stocks are recovered to and maintained at levels that can produce their maximum sustainable yield; and ensuring that food is produced sustainably and profitably.

A UK network of Marine Conservation Zones (MCZs), including sites in UK waters of the Irish Sea, is expanding, which is in addition to retaining the sites designated under the EU's Natura 2000 framework. There are also continuing international commitments, for example many of the coastal Sites of Special Scientific Interest (SSSI) becoming OSPAR Marine Protected Area (MPA) network.

Most activity by the NI fleet takes place in the UK's offshore waters and Northern Ireland's inshore waters (out to 12 nmiles), with some fishing in RoI waters and (for the pelagic fleet) in other EU Member State waters. Fishing within NI's inshore waters is expected to continue without spatial restrictions for vessels using relatively benign static gear (pots) for shellfish. However, there is also some inshore trawling and scallop dredging and it is expected that these gears would be prevented from fishing within MPAs in Northern Ireland's inshore waters if such restrictions are not already in place (as for Strangford Lough). For MCZs in UK offshore waters, similar restrictions on trawls and dredges are proposed and it is expected that this fishing effort will be displaced to fishing grounds that remain open. In the short term there may be a negative economic impact of these enforced changes, but it is expected that fleets will adapt their fishing patterns to be able to take up their fishing opportunities.

1.5 Climate change

The latest Intergovernmental Panel on Climate Change (IPCC) report on the oceans and cryosphere states that 'sea-level rise has accelerated (extremely likely) due to the combined increased ice loss from the Greenland and Antarctic ice sheets' (IPCC, 2019). Thermal expansion of water bodies further contributes to sea level rise. Extreme wave heights, which contribute to extreme sea level events, coastal erosion and flooding, have increased in the Southern and North Atlantic Oceans by around 1.0 cm yr^{-1} and 0.8 cm yr^{-1} over the period 1985-2018 (medium confidence).

Sea level continues to rise at an increasing rate. Extreme sea level events that are historically rare (once per century in the recent past) are projected to occur frequently (at least once per year) at many locations by 2050 in all RCP scenarios, especially in tropical regions (high confidence). The increasing frequency of high water levels can have severe impacts in many locations depending on exposure (high confidence) (IPCC, 2019).

Figure 3 presents estimated sea level rise for the County Down coastal area between 2007 and 2100. At 2080, within the expected 50 year timeframe for port infrastructure investment, sea levels are expected to increase by 0.2m to 0.45m. The UK Climate Projections marine report estimates that by 2100 sea levels at Belfast could rise by 52cm under a low emissions scenario and up to 94cm under a high emissions scenario (Palmer et al, 2018). The risk of coastal flooding will increase with sea level rise and more frequent storm surges. Given the revised data presented in the IPPC 2019 report showing that polar ice loss is more rapid than previously thought, these may already be under-estimates of sea level rise.

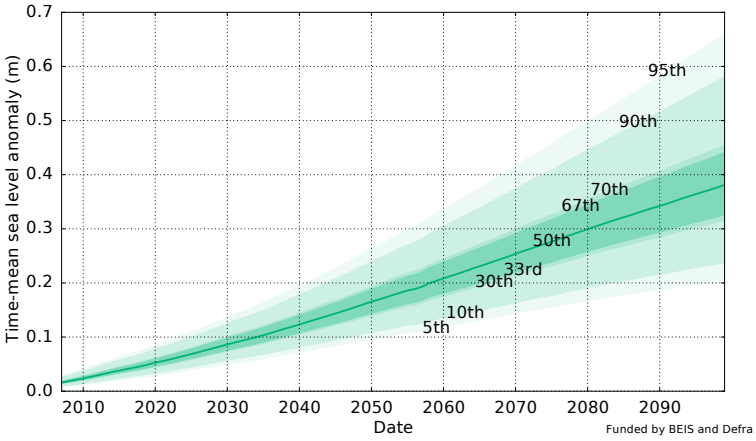


Figure 3 Projected change in sea level for County Down coastal area (source: UKCP, 2018)

In addition to sea level rise, climate change is affecting sea conditions with an increase in average wave height and sea surface temperatures recorded in the Irish Sea. There has also been resulting changes in flora and fauna with more diatoms and dinoflagellates in the phytoplankton, warm water copepod and gelatinous zooplankton species, and increased numbers of warm water fish species and sightings of exotic fish species (Marine Institute, 2009).

A further impact of climate change is ocean acidification which results from rising CO_2 levels. Henroth et al (2012) simulated the impact of ocean acidification on Nephrops (the most important species for the NI seafood sector) and found that the levels predicted by 2100 cause immune suppression that could impact disease severity and spread. This impact is further exacerbated by higher temperatures and could pose a significant long-term threat to the Irish Sea prawn fisheries.

Fernandes et al. (2017) suggested that losses in revenue [due to changes in species and their distribution] could range between 1–21% in the short term (2020–2050). England and Scotland are the most negatively impacted region in absolute terms and Wales and North Ireland in relative terms.

The priority impacts and consequences for the seafood sector suggested by the Irish Government in their Agriculture, Forest and Seafood Climate Change Sectoral Adaptation Plan (DAFM, 2019) are presented in the table below. It is notable that the impact on infrastructure is noted and the need to upgrade to address the impact of storm events, siltation and sea level rise.

Table 3 Priority climate change impacts and potential consequences for the Seafood sector

Impact	Consequences
Changes in the timing of fish spawning and subsequent changes in the timing of harvesting	Economic losses. Knock on effects on the survival and development of juvenile fish populations. Suitable larval food availability reduced as plankton populations move north.
An increase in the occurrence of harmful algal blooms	Restrictions on shellfish harvesting opportunities with potential for economic losses. Additional resourcing to ensure monitoring of seafood safety is not compromised.

Existing seafood infrastructure may become obsolete or require considerable upgrading	Increased maintenance costs over time if infrastructure is not suitably upgraded to take account of impacts such as extreme storm events, siltation and sea level rise.

Source: DAFM, 2019.

The UK government has committed to a Net Zero target by 2050. The Climate Change Act 2008 (2050 Target Amendment) Order 2019, which is going through parliament process, increases the target from 80% to 100%. Net zero means any emissions would be balanced by schemes to offset an equivalent amount of greenhouse gases from the atmosphere, such as planting trees or using technology like carbon capture and storage[2].

Food production is responsible for a quarter of anthropogenic greenhouse gas (GHG) emissions, of which fisheries contributed 4%. The Fuel Use Intensity of fleets targeting crustaceans by trawl are orders of magnitude higher than those fishing mid-water for small pelagics or operating passive gear (Parker et al, 2018). While the fuel use during harvesting is the largest single contribution to emissions, transport is also a significant part of overall emissions in the lifecycle of seafood products. The overall carbon footprint of food is likely to come under closer scrutiny in the future, which will have implications for Northern Ireland's export-orientated seafood market. This will be explored further in the Stage 2 report to inform the FSDP.

Shipping through the International Maritime Organisation (IMO) has committed to a 50% CO_2 reduction target by 2050[3]. Alternative fuels such as biodiesels or liquified natural gas (LNG) are being researched by the shipping sector, as are developments in hybrid, full-electric or hydrogen fuel-cell powered engines. Some commentators believe that the hydrogen fuel cell, likely combined as a hybrid system with batteries, is the most viable zero-emission option and fuel-cell powered ferries are expected to be operational in Norway in 2021[4]. Hyseas is an EU project with Scottish partners, is entering its third phase to test fuel cell hybrid propulsion systems on an Orkney inter-island ferry[5].

The fishing industry's contribution to emissions is small compared to shipping and is a relatively low emissions food compared to other animal protein such as beef & lamb. It will nevertheless be encouraged to reduce emissions through incentive schemes or fuel taxation. Future vessels will ultimately adopt technical developments in marine engines that improve efficiency and reduce emissions, such as those being promoted through projects like the international Green Voyage 2050 launched in 2019[6].

NGOs are urging the fishing industry to make the move to less fuel-intensive and less impacting gears, actively lobbying governments to require such moves. The potential for Northern Ireland's fleets to change gears and adapt to the future low carbon economy is explored for each of NI's key fleet segments in this Stage 1 report.

[2] https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

[3] https://www.maritime-executive.com/article/imo-agrees-to-co2-emissions-target

[4] https://www.norled.no/en/news/the-appearance-of-the-hydrogen-ferry-begins-to-take-shape/

[5] https://www.hyseas3.eu

[6] http://www.imo.org/en/MediaCentre/PressBriefings/Pages/08-green-voyage-2050.aspx

1.6 Report structure

1.6.1 Stage 1 report (this report)

This report presents findings from Stage 1 of the Fishing & Seafood Development Programme, which focuses on Northern Ireland's fishing fleet and the biological resources on which it depends.

The report is structured around the key fleet segments described in the section above, namely:

- The Demersal fleet (targeting Nephrops, whitefish and scallop on a seasonal basis)
- The Pelagic fleet (targeting small pelagics, mainly mackerel and herring
- The Inshore fleet (targeting mainly crab and lobster)

The operation, trends and issues facing each fleet are presented, including current port provisions. These lead to conclusions on the future needs for Northern Ireland's fishing fleet and recommendations for infrastructure investment and other fleet-related support.

1.6.2 Stage 2 report

Stage 2 of the FSDP will focus on post-harvest and shore-based sectors:

Seafood products and markets: This will set out the current situation and trends in supply chains and consumer trends that will inform future market and processing requirements for Northern Ireland seafood.

Other port-based sectors: Sectors directly supporting fisheries & seafood operators such as engineering, vessel servicing & repair, fuel & vessel supplies and other sectors contributing to the maritime economy and coastal communities.

Future Opportunities: The potential to develop new and under-exploited areas of the fishing and seafood sectors (such as algae or other fish and shellfish species) and new port-based sectors such as marine bio-tech. It will also further explore emerging opportunities such as climate change and EU exit[7].

1.6.3 Development Programme

The development programme will be produced based on the Stage 1 and Stage 2 findings. This will set out the actions required to deliver the infrastructure investment needs and other support requirements to help the NI sector realise its full potential.

[7] The date for the UK's exit from the EU is currently the end January 2020 and it is uncertain how the December UK general election will impact this. However, some preliminary analysis is also included in this Stage 1 report.

2. Trends in Northern Ireland's Fishing Sector

This section provides an overview of the trends evident in Northern Ireland's fishing sector in terms of the fleet, the landings and the biological resources. The subsequent sections then go on to explore particular fleet segments in more detail (demersal, pelagic and inshore fleets). More analysis of the trends in fleet dimensions is provided in Appendix C: NI Fleet Physical Characteristics.

2.1 The fleet

In the 1980's Northern Ireland's fleet was expanding. Between 1984 and 1989, over 100 vessels were added to the NI fleet, which grew from 337 to 442. Half of these were added to the over 12m fleet and the Gross Registered Tonnage (GRT) increased by 74% over that short period (MAFF, 1992). Today the total fleet has reduced in number to 332 (close to 1980 levels), but the tonnage remains around this level. Since the fleet expansion of the 1980's, the long-term trend is one of consolidation to fewer, larger more powerful vessels. The catching capacity has increased, but vessels have become more specialised to target specific fisheries such as Nephrops, whitefish or pelagic fisheries, rather than targeting several fisheries with the same vessel on a seasonal basis as happened historically.

Figure 4 shows the number of over 10m and under 10m vessels in the NI fleet since 2006. The inshore fleet continued to grow up to 2013, when a decrease is seen and numbers now fluctuate at just under 200 vessels. The over 10m fleet shows surprising consistency in number over the last 10 years, but with a noticeable decrease in 2018.

The power and tonnage trends for the NI fleet change significantly when the three pelagic vessels were replaced by larger vessels as they account for 40% of the registered tonnage and 28% of the engine power for the whole NI over 10m fleet. Without these vessels, a slight decline in GT and power would also be observed, as fewer but relatively larger and more powerful vessels remain in the over 10m vessel fleet.

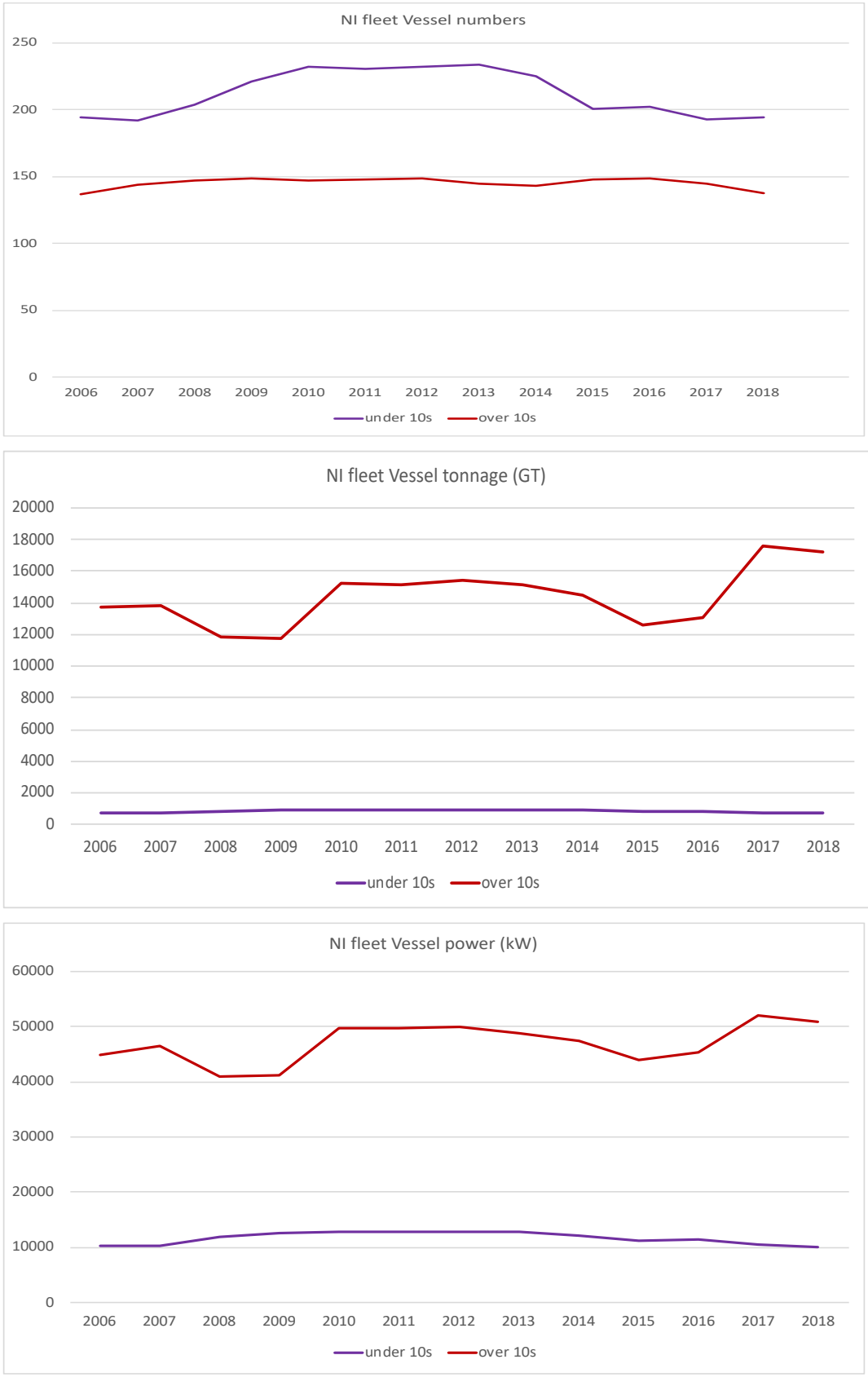


Figure 4 Over & under 10m NI Fleet 2006-2018 by number (top), GT (middle), kW (bottom) (source: MMO, 2019)

The average age of the NI fleet is older than fleets in Scotland, England and Wales (Figure 5). There is a culture of purchasing second-hand vessels, traditionally from Scotland, which is similarly dominated by the whitefish/Nephrops trawl segment, but more recently from Ireland and France. Those seeking to invest are looking further afield as recent availability from the Scottish second-hand market has been limited. Northern Ireland investment in new vessels has been more limited in the demersal fleet compared to the pelagic and inshore fleets. The reliance on second-hand vessels could in itself be considered a good investment strategy as it limits indebtedness compared to purchasing from now. However, as we explore later (see section 3.4.1), it is a constraint that will become more acute in the future as new vessels are being designed deeper with a larger draught as well as wider (see Appendices C & D). These new vessels may face too many operational constraints to be suitable for the water depths and tidal nature of NI fishing ports.

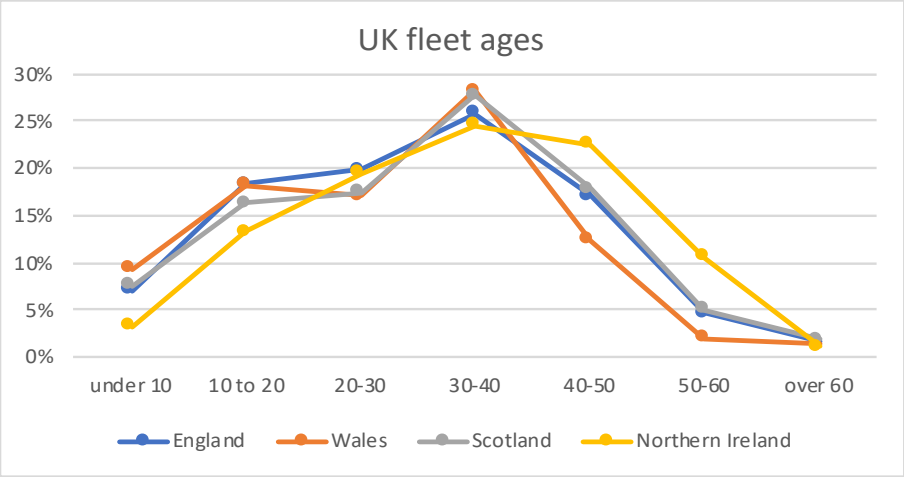


Figure 5 The age of UK fishing fleets (source: MMO, 2019)

With the exception of the pelagic fleet, the figures below illustrate the dominance of mid-sized trawlers (16-22m in length) in landings by the NI fleet, accounting for around half of the volume and value landed over the past ten years.

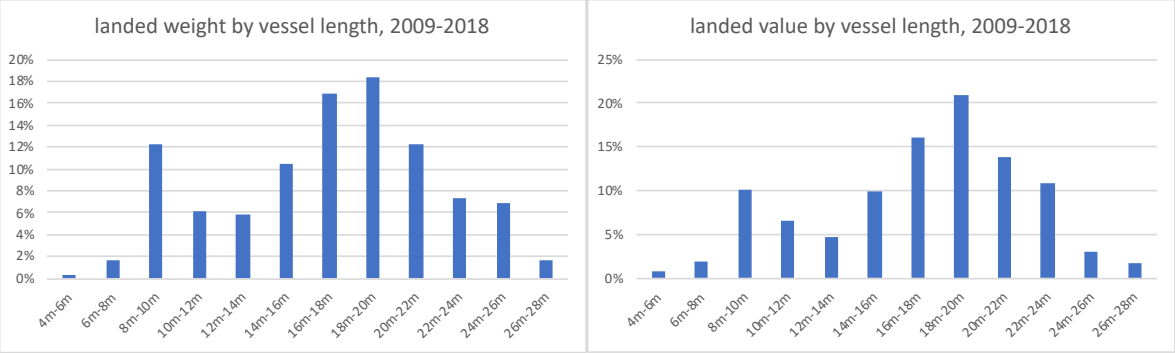


Figure 6 Landed weight and value into NI ports by vessel length (2009-2018) (source: DAERA, 2019b)*

*figures do not include the 3 NI pelagic vessels.

2.2 Landings

Data from the UK's MAFF, the pre-cursor to DEFRA, provides some insight into the longer-term trends in landings into Northern Ireland, even though the accuracy of reporting is questionable compared to today's data derived from the vessels' e-logbooks.

In 1948 landings into Northern Ireland were reported as 10,000t with 3/4 coming from demersal and ¼ from herring (MAFF, 1992). Only 254t of shellfish landings were reported, although it is likely that there was little reporting of landings by the inshore fleet.

By 1960, overall landings had decreased to 7,500t due to demersal landings dropping to only 2,235 t and only partly compensated by a near doubling of herring landings to 4.600t and an increase in shellfish landings to 661t.

By 1970 NI landings had recovered to above 1948 level with 11,887t landed: demersal landings had recovered somewhat to 3,810t, herring remained levels similar to those seen in 1960, but the big growth was in shellfish with a five-fold increase to 3,454t.

By 1980 total landings remained at similar levels of 11,438t, but demersal landings had recovered to the levels seen in 1948 at 7,579t; the herring fishery had decreased to similar levels as 1948, but shellfish landings more than halved from 1970 levels to 1,349t.

By 1990 (with the increase in fleet reported in the above section), total landings into NI doubled to over ten years to 22,565t: demersal landings had increased to 11,000t, pelagics came back to over 4,000t and the biggest increase was seen with shellfish landings, which reached 5,878t.

Although the earlier data is less robust and detailed than that available since 2006, it is interesting to note that total landed volume in 1990 is at a very similar level to the average landed into NI ports between 2006 and 2018 (22,370t). The trendlines shown in Figure 7 show that value of landings fluctuates far more than the volume, but the growth in value is greater than for landed volume. In 2016 and 2017 the value landed in NI ports exceeded £30million, although reduced landings in 2018 saw this dip back to 2015 levels mainly due to reduced *Nephrops* landings.

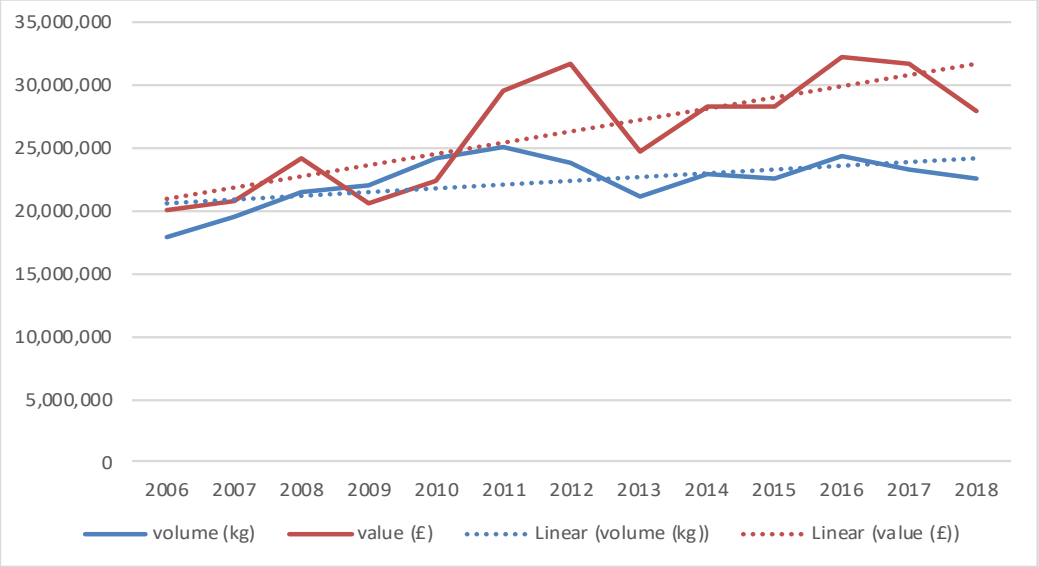


Figure 7 total landings into NI ports by volume (kg) and value (£) 2006-2018 (source: DAERA, 2019b)

It is important to distinguish between the total landings from NI vessels and the total amount they landed into NI ports. In 2018 the total catch amounted to over 52,000t with a first-hand sales value of over £57.5 million. By contrast landings into NI ports in 2018 amounted to 22,500t with a value of £27.9 m (DAERA, 2019b). The main reason for this difference is the NI pelagic fleet: three large vessels that land some of their catch to processors in Scotland, Ireland, Norway and Denmark. There are also landings by the demersal and scallop fleets to ports outside NI when fishing *Nephrops* in the Clyde or scallops around the Isle of Man. Some of these landings are transported back to NI processors.

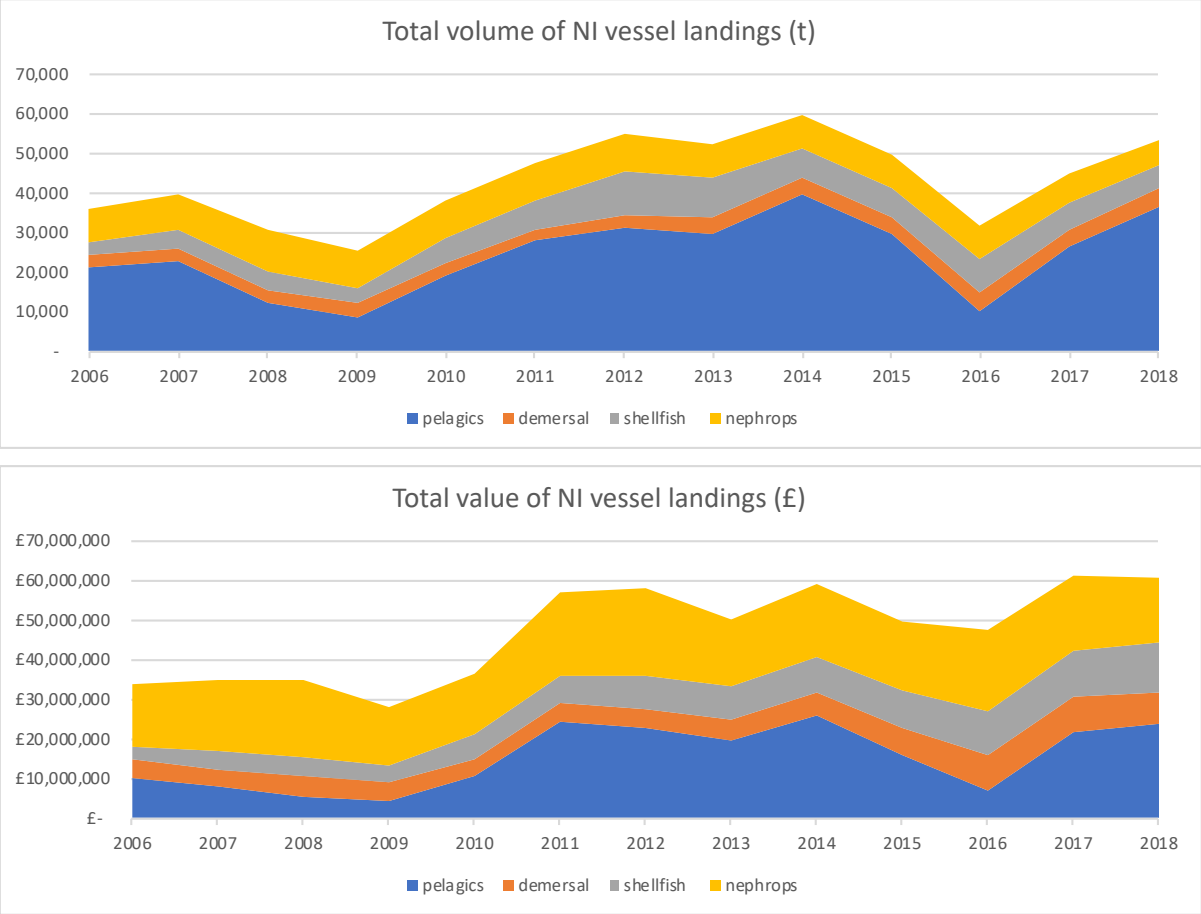


Figure 8 Total volume (top) and value (bottom) of landings by NI vessels (source: DAERA, 2019b)

Figure 8 shows the landings by NI vessels between 2006 and 2018 (the period for which reasonably reliable data is available, including the under 10m fleet. Landings increased by 47% in volume and 73% in value over this period. Inter-annual changes are most pronounced in pelagic landings, with the significant drop seen in 2016 due to a fewer pelagic landings before a new pelagic vessel re-entered the fleet.

The total landings figures clearly show the importance of *Nephrops* to NI landings, accounting for an average of 40% of the landed value. However, while *Nephrops* landings continue to fluctuate between 8,000 to 10,000 t (albeit with a dip in 2017/18 due to a variety of factors), the landings of other species contributed to the growth observed. The landings of other shellfish species has more than trebled in value and their overall contribution to total landed value has grown from 10% in 2006 to 21% in 2018. The contribution of pelagics and demersal species has fluctuated in recent years for different reasons.

Pelagic landings have more than doubled in value and over 70% in volume, but with large inter-annual variation due to quota availability, but also influenced by investment cycles with the three large NI pelagic vessels.

Demersal landings are predominantly bycatch from the Nephrops fleet and so are strongly influenced by the Nephrops fishery as well as the catching opportunities for whitefish species. The recovery of some Irish Sea stocks such as haddock has contributed to increases of 50% in volume and 79% in value over the period. Landings were limited by quota availability for some whitefish species and the need to operate highly selective gear for Nephrops as part of the cod recovery plan.

The under 10m fleet over the 2006-2018 period contributed around 6% of the total landed volume and 8% of the landed value. This has been relatively consistent and reflects the growth in the inshore fleet seen up to 2013, but is slightly below the levels of change in the fishing sector overall with a 25% increase in volume and a 63% increase in value during this period.

2.3 Biological resources

The Northern Ireland fishing and seafood sectors are heavily dependent on biological resources from the Irish Sea: the post-harvest sector sources a relatively small amount of raw material from imports or aquaculture. All inshore catches and the great majority of demersal catches by the Northern Ireland fleet are from the Irish Sea, while around 20% of pelagic landings (but 38% of herring catches) are from the Irish Sea.

The ongoing ICES workshop on an ecosystem-based approach to management for the Irish Sea, WK IRISH, provides the following summary of the Irish Sea ecosystem:

Although open to both north and south, the bathymetry of the Irish Sea is relatively enclosed, and the area can be thought of as a large lake. The surrounding land includes large centres of population and is subject to intensive farming, whereas the marine environment is heavily used by both the industrial and tourist sectors. The fish stocks have overlapping spawning, nursery, and adult population zones, so the ecosystem as a whole is characterized by multiple overlapping usage and pressures.

The Irish Sea ecosystem has undergone considerable changes since 1960. A general increase in sea surface temperature is linked to increased northwards flow of warmer Atlantic waters, and a positive phase of the Atlantic Multidecadal Oscillation (AMO) and the increasing influence of global climate change. Cod, whiting, and sole spawning-stock biomass have decreased whereas herring and particularly haddock have shown signs of recovery in the more recent period. Nephrops landings have increased whereas those of other stocks have declined. At the same time, reductions in zooplankton important for fish recruitment have also been observed while concurrent increases in phytoplankton have been linked to possible reductions in grazing pressure. Meanwhile increases in ocean colour and gelatinous zooplankton may be linked to anthropogenic disturbance and climate change.

Irish Sea fisheries have changed from a cod, whiting, sole and herring dominated fishery in the 1960s to one which is dominated by Nephrops and other shellfish stocks today. Since the early 2000s, ICES has been advising zero catch for cod and whiting. Despite effort reductions of >90% in the large-mesh otter trawl fleet, and other measures to recover the cod stock, there is little evidence of any stock response, suggesting ecosystem changes may be playing a role by modifying levels of natural mortality and thus offsetting the decline in fishing (WK IRISH, 2015). The latest ICES advice relating to Irish Sea cod and whiting shows this lack of recovery has continued with ICES advising zero catches for whiting and only 116 tonnes for cod in the Irish Sea for 2020 (ICES, 2019).

There is evidence of truncated age structures in most Irish Sea stocks. Key issues to be resolved include whether this pre-dates the onset of heavy exploitation, and whether it is caused by environmental conditions inside the Irish Sea or reflects net migration of mature fish. Metrics for maturity-at-length, and weight-at-age are decreasing, suggesting that fish stocks are under pressure to mature more quickly, either as a result of high fishing pressure, natural mortality, or other environmental factors. Management policy issues concern interactions between the three main fisheries, Nephrops*, gadoids, and scallops/whelks.* Nephrops *and scallops are the most important economically, but the key mixed fishery interaction is between the* Nephrops *and several fisheries (e.g. gadoid and sole)* (WK IRISH 1, 2015).

Preliminary findings suggest that the changes in the stocks in the Irish Sea are likely driven by changes in fishing pressure AND changes in broader ecosystem drivers, notably the North Atlantic Oscillation (NAO), possibly through primary productivity, and temperature changes. Temperature has increased substantially in the Irish Sea since 1973 (WK IRISH 3, 2017).

Modelling at a UK-wide level has suggested that temperature increases may result in reduced biomass as stocks will be constrained by suitable habitats and water depths. Fernandes et al (2017) projected standing stock biomass decreases between 10 and 60%. These impacts translate into an overall fish and shellfish catch decrease of between 10 and 30% by 2020 (MCCIP, 2017). The impact is greatest on inshore fleets that are limited in their range compared to offshore fleets that could to some extent follow the changed distribution patterns.

WKIrish proposed that ecosystem indicators, derived from ecosystem models in development, could be used to inform catch advice of individual stocks by using information to set catch advice within the current ranges of F_{MSY}. This method fits within the framework of both existing ICES precautionary advice and EU regulations, and WKIrish therefore proposes further re- search on how to implement this (WK IRISH 5, 2018)

The scientists collaborating through WK IRISH continue to explore an ecosystem-based approach to management of Irish Sea fisheries, but for now management remains single-species, albeit with the recognition of interactions as shown in the Western Waters Multi-annual Plan (EU Reg. 2019/472).

In the following chapters, the status, trends and governance for key biological resources targeted are detailed for each of the fleet segments (demersal, pelagic, inshore).

3. The Demersal Fleet

The Demersal fleet accounts for the great majority of over 10m vessels in Northern Ireland's fleet. These operate bottom trawls, most now twin-rigged, and some move to scallop dredge on a seasonal basis.

3.1 Biological resources

3.1.1 Description & Status of commercial resources

Over the past fifty years, the changing availability of resources has led to the fleet shifting from a whitefish-targeted fleet to a fleet that predominantly targets Nephrops in the Irish Sea, with whitefish as a by-catch. Some vessels also diversifying into seasonal king and queen scallop fisheries, while larger vessels in the flight may travel further afield to the North Sea to fish Nephrops and the English channel on non-quota species such as cuttlefish.

Demersal landings averaged just over £20 million from10,000 tonnes per annum since 2006. Scallop landings averaged £3.3 million (£2.5 king scallop and 0.8m queen scallop) from 2,800 tonnes over the same period, but grew to a peak of £6.6 million in 2016, before reducing to £4 million in 2018.

Figure 9 shows the dominance of Nephrops, accounting for 73% of the landed value of demersal catches since 2006. Scallops are ranked second with 10%, followed by haddock (5%) and queen scallops (3%). When considered by weight, Nephrops still dominates at 60% of total demersal landings, while king and queen scallops accounted for a near equal share of landed volume, together amounting to 23%.

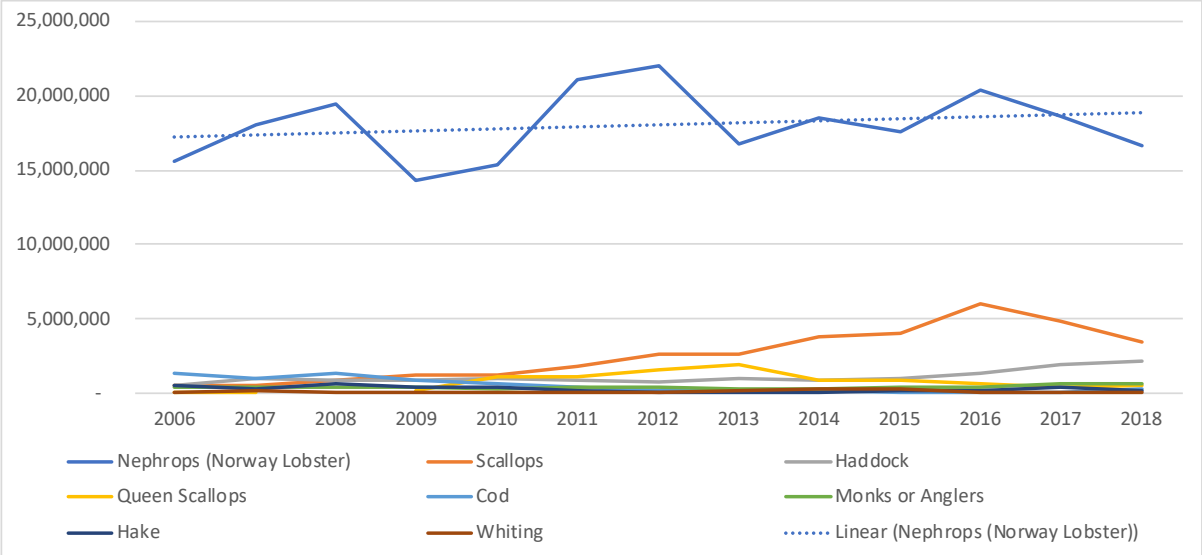


Figure 9 Value of demersal landings by the NI fleet by species 2006-2018 (source: DAERA, 2019b)

The Western English Channel cuttlefish fishery has become an important autumn fishery in recent years for the vessels in the demersal fleet large enough to travel that distance. From landings worth only a couple of thousand in 2016, landed value has grown to over £300,000 in 2018, very close to the value of cod landings.

Nephrops

The singular importance of *Nephrops* to the NI demersal fleet is very evident in Figure 9, but its value is likely to be underestimated in the general catch statistics. As Figure 10 shows, Nephrops of a size and quality that can be landed whole (sold as langoustine mainly for export markets), achieves a far higher price than the Live Weight Equivalent (LWE) price for tailed (breaded for the UK & Irish scampi market).

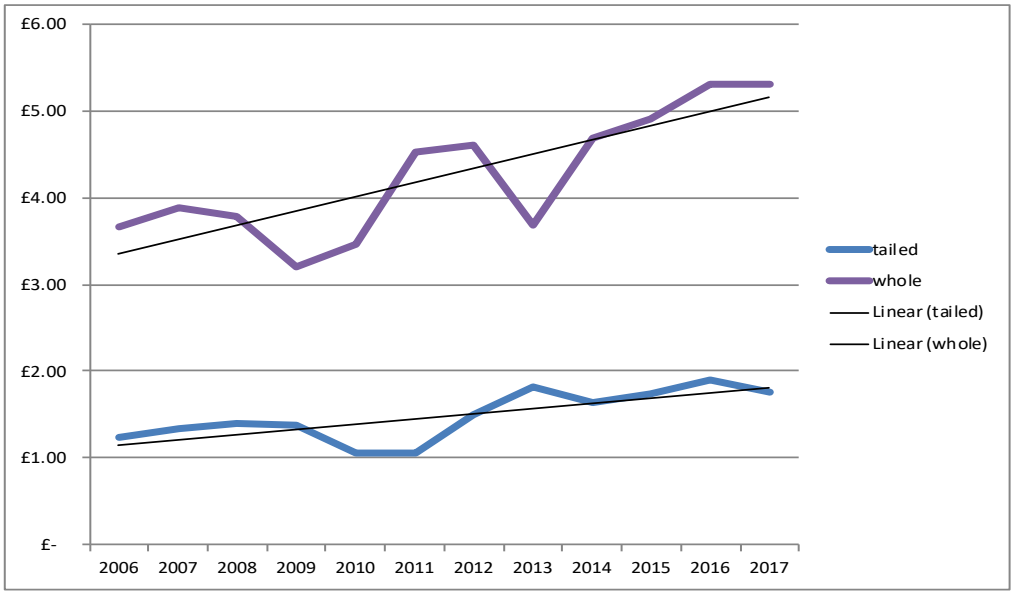


Figure 10 Prices for whole and tailed *Nephrops* 2006 to 2017, (source: Poseidon, 2018)

Nephrops burrow in soft muddy seabed and so distinct fishing grounds are well-defined with stocks assessed as 'functional units' (FU) related to these grounds. Unlike finfish surveys, the status of *Nephrops* stocks is determined by the burrow density observed using an underwater TV survey.

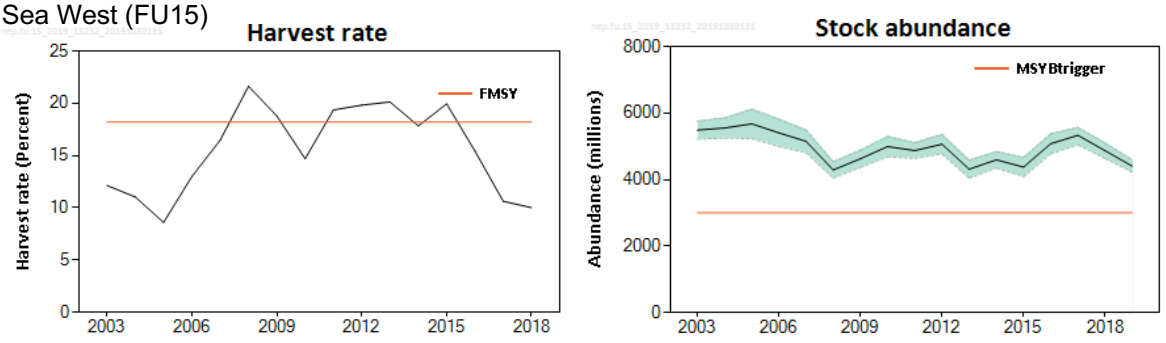
The most important FU for the NI fleet are FU15 (Irish Sea West), accounting for 58% of the landed value of *Nephrops* between 2006-2018. FU13, the Clyde fishery is also important for the NI fleet (13% of catch value), as is FU14 (Irish Sea East) with 9% of catch value. FUs that are further afield in the Celtic Sea and North Sea account for a few % each and their contribution is more variable, being dependant on the fishing opportunities in the three FUs that are closer to NI.

Table 4 ICES rectangles with the highest value of Nephrops landings by the NI fleet. source: DAERA

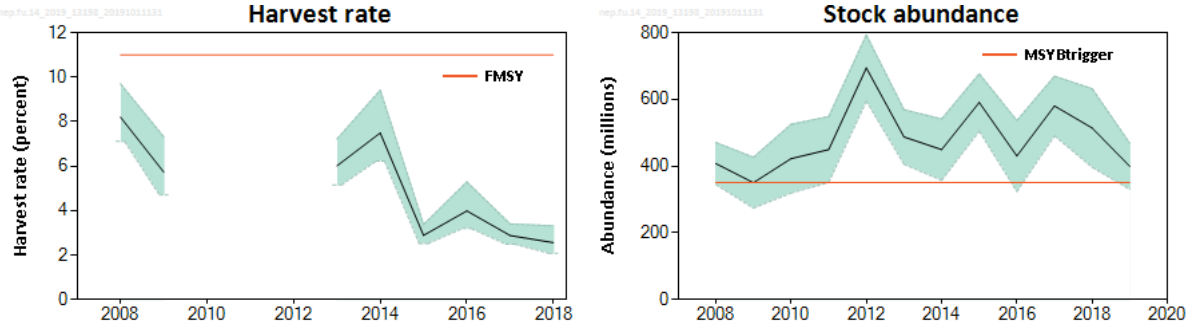
ICES Rectangle	Average % of Nephrops catch 2006-2018	Functional Unit
37E4	35%	Irish Sea West
36E4	23%	Irish Sea West
39E4	13%	Clyde
37E5	5%	Irish Sea East
37E6	4%	Irish Sea East

The most recent ICES advice for the three most important FUs (Irish Sea West, East and Clyde) (Figure 11) indicate that the fishing pressure has decreased in recent years and the stock sizes are above sustainable levels.

Irish Sea West (FU15)



Irish Sea East (FU14)



Firth of Clyde (FU13)

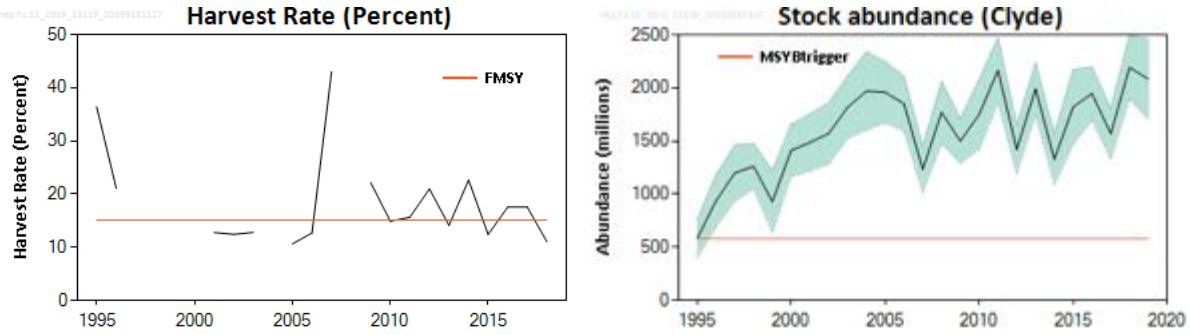


Figure 11 Nephrops harvest rates and stock status for Irish Sea West (top), Irish Sea East (middle) and Firth of Clyde (bottom). (source: ICES, 2019b)

Scallop

Awaiting AFBI information on scallop stock status – expected November 2019

The following was reported in the ICES working group, WG Scallop, report (ICES, 2017):

Stock	Fishery	Assessment method	Stock status	Fishing mortality	Advice
Irish Sea and West of Scotland AFBI, Northern Ireland (ICES, 2017)	Fleets targeting scallops landed into Northern Ireland include 59 vessels, 53% are under 12m in length. ICES rectangles 37E4 and 37E5 have highest landings.	Approximately 40 stations are surveyed annually. All scallops which are caught are aged, length recorded and total weight, muscle weight and gonad weight taken.	Stock not modelled. Results show that of 15 sampling stations, one has consistent catch records from 2016 to 2017, 7 show a decrease in catches and 7 show an increase in catches.	LPUE shows an upward trend in tonnes/day between 2000 and 2016	Not available

Finfish

The latest TAC advice on the status of the main finfish species caught by the NI demersal fleet (Table 5) broadly continues the trends described in relation to the Irish Sea ecosystem (see section 2.3 Biological resources) with cod and whiting showing little signs of recovery. Irish Sea haddock and plaice are in better shape, with catch reductions advised to remain within MSY levels. Some stocks managed at a larger Area VII scale (hake and monkfish) are also assessed to be in good status, but may face further reductions if fishing effort is to be managed to F_{MSY} levels under the Western Waters MAP.

Table 5 2019 TAC proposed and ICES advice for key Irish Sea and Area 7 finfish stocks

Stock	TAC 2018	2019 Proposal	% Change	2020 Advice	% change	Summary of ICES Advice
Cod	807	257	-68	116	-55	Stock size unknown so reduce to a low precautionary catch
Haddock	3739	3156	-16	3,156	0	In a good state – keep within limits defined in the MAP
Whiting	1246	0	N/A	0	0	In a poor state - zero catch advice for 2020 and 2021
Plaice	3075	2790	-9	5,640	+102	in a good state – keep within limits defined in the MAP
Sole	414	457	+10	561	+21	Biomass recovering, but still slightly below MSY
Cod 7 b-k	1,610	189	-82	0	n/a	Zero catch advice
Megrims 7	18,132	18,732	+3	19,982	+7	In a good state – slight increase under the MAP
Anglers 7	32,999	35,299	+7	31,798	-10	Biomass recovered above MSY, F reduced to MSY
Haddock b-k	8,329	10,859	+3	16,671	+54	in a good state – keep within limits defined in the MAP

Whiting 7b-k	19,184	15,841	-21	6,481	-60	Applying the MAP means a substantial reduction
Hake (Northern stock	79,762	63,325	-21	104,763	+65	In a good state – catches increased
Pollack 7	12,163	7,298	-40	3,360	-54	Precautionary advice to further reduce catches

Source: ICES https://www.ices.dk/community/advisory-process/Pages/Latest-Advice.aspx

3.1.2 Resource management

A perennial weakness of Nephrops fisheries management is the setting of quota at ICES area level, i.e. Area VII as a whole, rather than specific to each FU. This creates the possibility of an FU being overfished. Multiannual management is helping to address this through ensuring that additional management measures can be put in place where the assessment of an FU suggests the fishing pressure should be limited further.

The ICES advice is now provided in relation to the Western Waters Multi-annual plan (MAP) (EU, 2019). In accordance with the MAP, catches higher than those corresponding to F_{MSY} can only be taken providing SSB is greater than MSY $B_{trigger}$, and one of the following conditions is met:

a) if it is necessary for the achievement of objectives of mixed fisheries;

b) if it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics;

c) in order to limit variations in fishing opportunities between consecutive years to not more than 20%.

3.1.3 Future prospects

The UK remains a party to the UN Convention on the Law of the Sea (UNCLOS) which includes commitments to the sustainable management of shared stocks. The Government acknowledges that "virtually all stocks fished by the UK" are highly migratory species whose conservation and management will require cooperation with other coastal states (Defra, 2018). Leaving the EU's CFP is not expected to radically change the UK's objectives for fisheries management or disrupt the basis for scientific advice on these shared stocks and the involvement of UK scientists, including AFBI staff, in the provision of that scientific knowledge.

The future for ***Nephrops*** fisheries specifically is generally positive as the status of the three most important FUs is considered to be good. Access to parts of some current grounds may be restricted in the near future as the designation of areas in the Irish Sea within FU15 as Marine Conservation Zones (MCZ) is expected to prevent bottom trawling on mud habitat. The full extent of the economic impact is unknown, but it is expected that the existing grounds will accommodate most of the displaced fishing effort and the larger vessels can fish alternative grounds further afield if the need arises. It is unclear whether the environmental protection afforded these areas will result in any noticeable *Nephrops* fishery benefits as recruitment to the stock may be limited by available burrow space and, in the absence of trawling, the seabed may become more dominated by sedentary species such as sea pens.

Future prospects for **scallop** fisheries are also positive as, after many years of comparatively limited management and regulation, the scallop sector recognises more needs to be done to ensure a sustainable sector and is calling on fisheries managers to support efforts to improve management.

Recent initiatives by the UK Scallop Industry Consultative Group (SICG) and a UK scallop Fisheries Improvement Project (FIP) show that more attention is being paid to the management of these non-quota stocks. There have also been recent efforts by AFBI and the NI industry to explore scallop larval dispersal in order to identify inshore areas that could be important for scallop recruitment and may benefit from zoning to protect these key stock components. This research builds the knowledge base on scallop stocks, which may mean that a re-think of future management units will be required.

NI scallop landings have been impacted by the introduction of restrictive licensing of Isle of Man fisheries (Figure 9 - note reduction since 2016), limiting the number of NI vessels that can continue to participate in Isle of Man scallop fisheries. However, those that are able to participate are expected to benefit from relatively well-managed fisheries. There is growing concern about the negative environmental impact of scallop dredges on seabed habitats, which may restrict the potential to expand and develop scallop fisheries.

The future for **whitefish species** is less certain as the lack of recovery noted by WK IRISH may well result from long-term trends in the ecosystem that do not suggest that a large-scale recovery of whitefish stocks is likely. This is particularly the case for cod, which favours colder water and so a more northerly distribution is likely. By the same token some species associated with more southern distributions may be expected to move into the Irish Sea. To date this is not discernible in landings data as the increase in landings of some species such as cuttlefish, red mullet, bass and gurnard relates to vessels fishing in more southerly fishing locations such as the Celtic Sea and English Channel. Further research is needed to establish whether over the long term, opportunities are likely to emerge for temperate demersal species.

The future status of the varied resources upon which the demersal fleet relies is not possible to predict, but the long term trends indicate that the overall volumes are stable even if the species mix fluctuates. The most important Nephrops functional units for the NI fleet (15, 14 and 13) are considered in good shape and fished at sustainable levels. Improved management of Nephrops and other key stocks through the Multi-Annual Plan; greater attention to scallop fishery management; and improved knowledge and protection of the wider environment should benefit demersal fisheries in the long term.

3.2 Fishing Activity

3.2.1 Demersal species

From 2008 to 2016, days at sea using demersal trawls have decreased from over 20,000 days at sea to around 14,700 days (House of Commons, 2018). However, this 24% decrease in effort has not resulted in a decrease in volume or value of demersal landings. In fact, the same period saw a 17% increase in landed value from very similar volumes of landings (Figure 12). Over this period landings into the three NIFHA ports accounted for 72% of landed value (Kilkeel 31%, Portavogie 22% and Ardglass 19%). Other notable levels of landings are made to Campbeltown (5% of landed value) when fishing in the Clyde; North Shields (3%) and Fraserburgh (3%) when fishing North Sea grounds; and Whitehaven (3%) when fishing Eastern Irish Sea grounds. Landings into these ports fluctuate year to year depending on how good the fishing is on Western Irish Sea grounds closer to home.

The last five years has seen the proportion of total demersal landings into the NFHA ports grow to 75%. There were also increases of Nephrops (85%) and associated whitefish species being landed into Irish west coast ports, with over £2.5 million landed by the NI demersal fleet to Rossaveal and Castletownbere in 2018. This comes from the larger vessels in the fleet targeting *Nephrops* on

Porcupine Bank. For NI vessels, future access to this ground within the Irish EEZ will depend on the fisheries agreement to be negotiated between the UK and the EU.

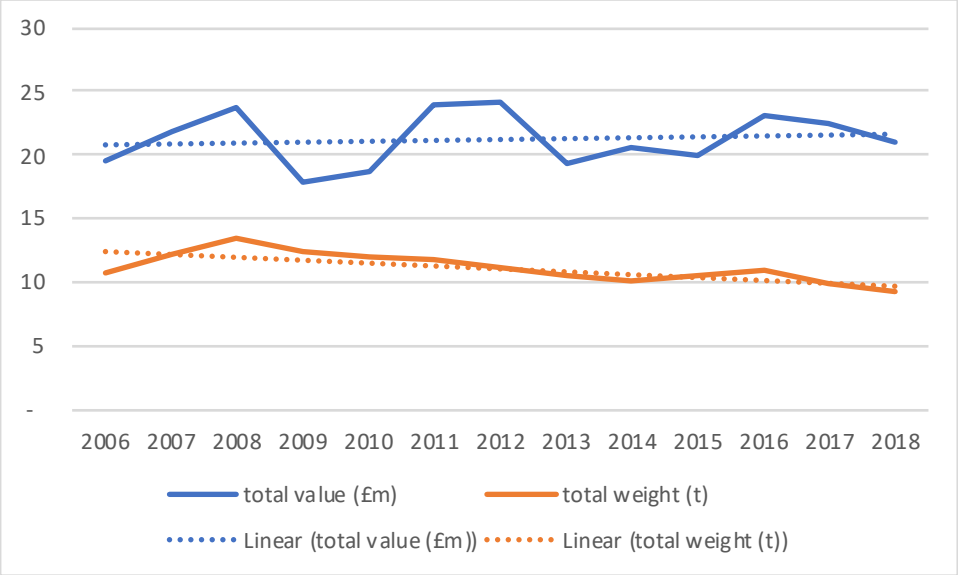


Figure 12 Trend in total volume (t) and value (£m) of landings by the NI demersal fleet (source: DAERA, 2019b)

The demersal species mix has not changed significantly. Nephrops still accounts for over 75% of the value of the catch; haddock has grown to over 10% of catch value as cod has declined from 2% to below 1%. Since 2006 there have been noticeable increases in the proportion of total landed value for monkfish (2.3%) and dogfish (3.6%).

The Western Channel cuttlefish fishery illustrates the greater opportunities potentially available to the larger demersal vessels in the fleet, as they are able to stay at sea for longer and travel further afield to participate in Celtic Sea, English Channel and North Sea fisheries. Since 2013, these vessels have landed cuttlefish into ports in SW England (Brixham, Plymouth, Newlyn, Portsmouth) with over £316,000 of cuttlefish landed into these ports in 2018.

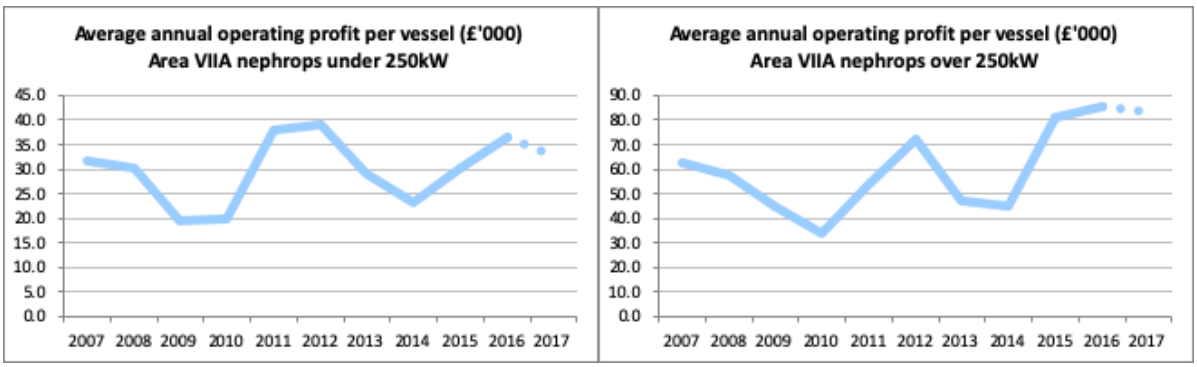


Figure 13 Average annual operation profit per vessel in the Irish Sea Nephrops segments under 250kW (left) and over 250kW (right) (source: Seafish, 2018)

The average annual operating profit for the Irish Sea Nephrops fleet is estimated through the Seafish fleet survey. There is some overlap in length categories between the under 250kW vessels and over

250kW two segments, but this distinction can broadly be considered as all vessels over 20m and some smaller vessels that are twin-rigged. Similar trends are observed between the two segments, namely continued profitable operation but considerable fluctuation across the 2007-2017 period when export markets were impacted by the financial crisis. Product prices have recovered from a low in 2009 and fishing costs, notably fuel have reduced somewhat since a peak in 2011. The difference between the two segments is broadly double, but both show a large range between the most profitable and least profitable quartiles illustrating that the demersal fleet includes some operators showing marginal profitability.

3.2.2 Scallops

Figure 14 shows the trend of increasing scallop landings up to 2016 when the scallop grounds around the Isle of Man were no longer open to some NI vessels due the introduction of a restricted licensing scheme. The queen scallop fishery on the Antrim Coast has declined over the last couple of years, making access to the Isle of Man fishery all the more significant for the NI fleet.

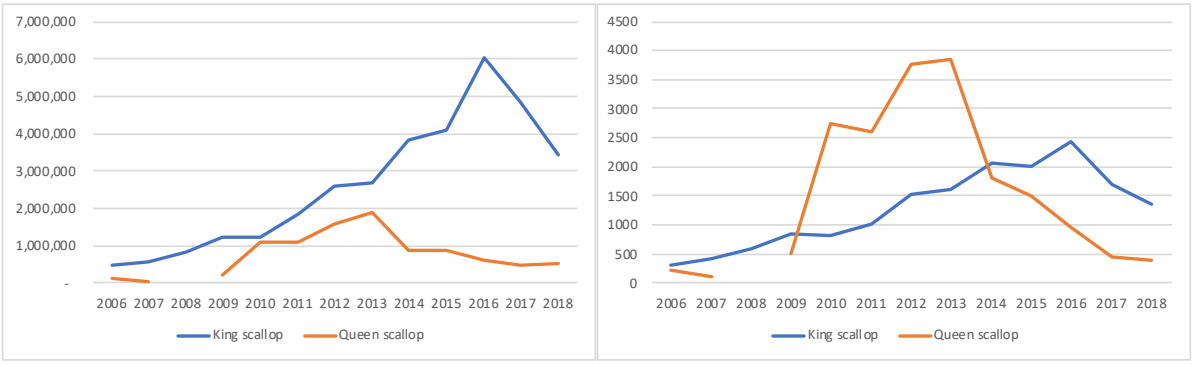


Figure 14 Trend in value (left) and volume (right) of NI scallop landings 2006-2018 (source: DAERA, 2019b)

Kilkeel (23%), Portavogie (14%), Ardglass (9%) and Bangor (9%) remain the top NI ports for scallop landings by the NI fleet. Landings into Isle of Man ports have grown in significance (now accounting for 30% of scallop landings), but the overall volume has declined over the last two years since the Isle of Man controls were introduced. There are also significant landings into Portsmouth (7% of landed value over the last two years), Greencastle (5%) and Ballycastle (3%).

Under 10m vessels operating scallop dredge accounted for 14% of landings, 10-15m 20% and over 15m 66% of landings (by weight) with the two largest scallopers in the fleet over 20m accounting for 18% of total landings. The contribution of the 10-15m fleet has increased over the last ten years, which is in part due to the Western Waters effort management regime which limits effort by vessels over 15m, but not under 15m.

Although Seafish (2018) reports that the average price per tonne has increased since 2012, the operating profit for the over 15m segment has not followed this and has reduced significantly since a peak in profitability in 2010, showing a close correlation with rising fuel prices (in 2016 fishing costs had return to the peak seen in 2011). Profits for the under 15m segment are shown to fluctuate, showing a closer correlation with scallop prices.

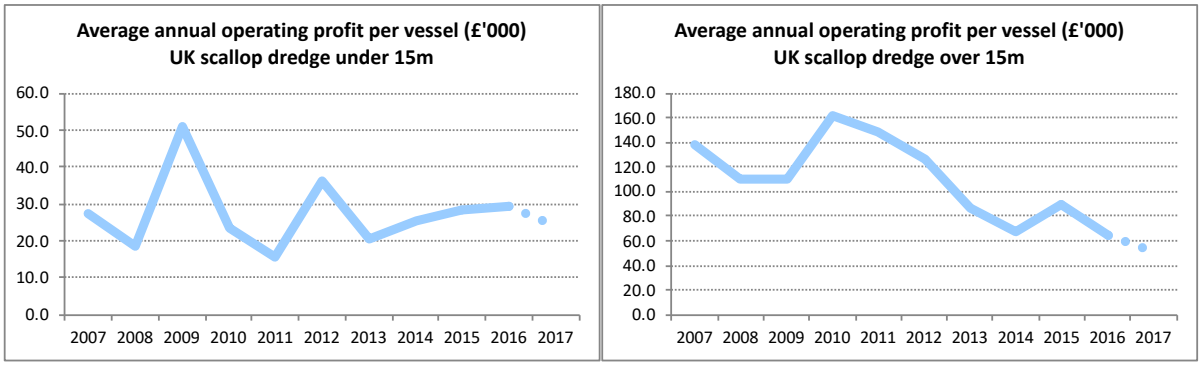


Figure 15 Average annual operation profit per vessel in the UK scallop dredge segments under 15m (left) and over 15m (right) (source: Seafish, 2018)

3.3 Vessel trends

3.3.1 Trends in physical characteristics & numbers

The number of vessels in the NI demersal fleet, i.e. over 10m vessels, excluding the pelagic and potting vessels, has shown a recent decline to just over 100 vessels with half of these based in Kilkeel and the remainder divided evenly between Ardglass and Portavogie.

Appendix C: NI Fleet Physical Characteristics shows the trends in certain physical characteristics of the NI fleet and Scottish fleets as an indication of what may be expected from future second-hand vessels entering the NI fleet. Demersal vessels have been getting larger. A larger vessel has relatively more flexibility on where to fish in terms of distance from port (able to participate in Celtic Sea, Channel and North Sea fisheries) and when to fish in terms of weather and sea state.

3.3.2 Vessel design

The trend for new vessels (Appendix D: Future Vessels) is for relatively deeper and wider hulls in relation to their length. New vessel designs (App. D) look for more space for accommodation (more private cabins) as well as operational space. Hulls are also deeper to account for larger propellers that provide improved transfer of engine power and so do not require such a large engine. Many vessels are also sitting deeper in the water with keels extending from below the propeller.

3.3.3 Gear

In recent years more selective trawl gears were introduced into the prawn fleet to reduce whitefish bycatch in response to cod recovery measures and the landing obligation. An ongoing gear trial continues and seeks to achieve still more selective trawl nets that will avoid the fleet being restricted due to a lack of quota for bycatch species.

With increased selectivity will come reduced bycatch of whitefish in the *Nephrops* fishery. This could lead to the future potential for whitefish-targeted fisheries such as cod, haddock and hake. The problems of mixed fisheries can in part be overcome by selective whitefish fishing methods like long-lining. Longline vessels are common gear segments in Spain and France, but there would be considerable costs and learning required to introduce the method into the NI fleet and the scale of whitefish catching opportunities in the Irish Sea is likely to remain too limited to warrant such a development.

The fleet is increasing the use of semi-pelagic trawl doors that minimise bottom contact and are therefore more fuel efficient with a reduced environmental impact. Nevertheless, there is increasing pressure from environmental NGOs to regulate against bottom-contacting gear for key habitats and designated areas. Irish Sea MCZs, designated to protect the mud habitats that support *Nephrops* fisheries, will create some restrictions on fishing for *Nephrops* on these grounds. This may result in somewhat reduced landings, but most effort is expected to be displaced onto other grounds.

There has been a trend towards multi-rigging (first twin-rigging, then triple rig and more recently quad-rigging) prawn trawls for economic and selectivity benefits with a lower headline height possible. This is however only feasible for the more powerful vessels in the fleet and requires extensive modifications.

Trawling remains the most effective fishing method for Nephrops on the grounds found in the Irish Sea. The alternative gear used to target *Nephrops* is pots, which are used in permitted areas of Strangford Lough where trawling is not permitted. The large-scale offshore trawl fisheries could not viably switch to potting: while the price achieved per kg of *Nephrops* would be greater, revenue from the bycatch of whitefish would be lost. The scale of potting effort needed to achieve the volumes currently landed by the trawl fleet is unprecedented in UK fisheries. The fleet would require extensive modification for potting, if not replacement as well as the major capital investment in gear required.

3.3.4 Efficiency

Efficiency can be improved through increased catch rates and reduced operating costs. The move towards more selective gear results in reduced bycatch and in some respects reduces catching efficiency for the demersal fleet. The ability to improve catch rates across the fleet therefore appears marginal. Efficiency is therefore more likely to be improved through reducing operating costs. The use of multi-rigs where more, but smaller nets are towed can be more fuel efficient and can help selectivity.

Appendix D: Future Vessels describes the expected developments regarding propulsion systems and fuel. The investment rates in the NI demersal fleet suggests that efficiency improvements are expected to be steadily adopted as engines or vessels are replaced. This could be accelerated by regulation, such as measures to support the recent UK government commitment to a zero carbon economy by 2050.

3.4 Issues & Opportunities

3.4.1 Port constraints

The extent to which owners can move to larger vessels is constrained by the cost of the vessel itself, the need to acquire more Vessel Capacity Units (VCUs) and the need for more fishing opportunities to pay it. A regulatory constraint results in all the demersal fleet having a registered length of below 24m, as above this additional crew costs are incurred as more qualifications are needed and an engineer must be employed. Owners also consider other factors including the operational constraints of their home port.

An FAO publication on fishing harbour planning and development advises that coastal fishery harbours require “At least 2.50 metres below Lowest Astronomical Tide level” (Sciortino, 2010). Kilkeel is reporting a maintained depth of 1.5m; Portavogie has 3m maintained within the harbour, but is nearer 2m at the harbour entrance (eOceanic.com); Ardglass is maintained at 3m in the channel and along the quaysides, but becomes shallower nearer the Sawpit where inshore vessels tie-up.

Table 10 in **Appendix F** provides a comparison of other UK and Irish ports with a similar scale of fish landings and this illustrates that the NI ports, particularly Kilkeel, face operational constraints due to both tide and safety limits to the point where a Notice to Mariners warns of the risks during certain weathers and tides and an AIS system provides live information on wind direction & speed, tide and wave heights.

A tidal constraint is more significant for the operation of a trawl fleet as it results in lost fishing time, whereas 'fishing time' is not lost for a passive gear fleet. The impact of reduced fishing trip length is relatively greater for the smaller prawn vessels than for the larger vessels as any lost fishing time is a greater proportion of overall trip length. However, this is balanced by the smaller vessels having a wider operational window either side of high tide. Both are affected by port operational constrains, which in addition to reduced revenue from lost fishing time, this can cause logistical problems in linking with buyer transport. When combined with the access constraints in certain weathers, particularly in Kilkeel, the NI fleet may have to decided not to go out to sea at all.

The considerable constraints for the demersal fleet fishing out of the Kilkeel clearly impact their operational efficiency. Nevertheless, Kilkeel remains home to the largest demersal fleet in Northern Ireland as well as numerous service companies and the main buyers of landed product, the seafood processors. Over the last five years the numbers in Kilkeel's over 10m fleet has been stable, while numbers in Ardglass and Portavogie have decreased significantly.

A comparative analysis of the NIFHA ports and consideration of some non-NIFHA ports is presented in **Appendix G**.

Strategically, all the NIFHA ports are well placed to access fishing grounds throughout the Irish Sea and Kilkeel is relatively well-placed for road connections via the 'M1 corridor' to the island of Ireland's main ferry routes from Belfast, Dublin and Rosslare. How strategically important each transport route is will depend on Northern Ireland's future relationship with the EU and the rest of the UK.

3.4.2 Employment

Employment is a critical issue facing the demersal fleet with a number of inter-connected issues:

- An ageing owner/operator group often with no obvious succession options.
- Limited interest in crewing or fishing as a career from school-leavers in local populations
- Reliance on non-EEA crew and the restrictions placed on fishing operations by visa conditions

A study to explore succession planning in the NI fleet was requested by Seafish Northern Ireland Advisory Committee (SNIAC) and is being planned by Ulster University for reporting in summer 2020. This should outline the scale of the problem, which will help to inform actions to tackle the issue. Some initiatives from the POs have already been implemented, such as the promotion of fishing as a career and the provision of training support.

A lack of interest in fishing as a career is reinforced by the observed lack of investment. The ageing fleet and port infrastructure do not show those outside the industry that the seafood sector provides good career opportunities. Public sector investment drives investment by the private sector, increasing confidence and certainty that the facilities needed to support their businesses will be available in the

long-term[8]. The lack of investment in the fleet exacerbates the crewing issues as experienced crew and new entrants are not attracted to old vessels with relatively poor accommodation and facilities compared to more modern vessels.

The difficulty to retain crew is a particular issue for the prawn fleet, as it currently requires the crew to tail much of the catch between hauls, which can take hours. In the long-term, developments in automation should address this, either through automated processing at sea or by bringing all of the catch onshore as whole prawns for the factories to process.

A shortage of local crew and the potential for cost-savings has led to a growing dependence on foreign crew. The NI demersal fleet now has a significant proportion of non-EEA crew, many from the Philippines and Ghana. UK immigration rules only permit non-EU/EEA crew to be engaged on fishing vessels operating outside the 12 nautical mile limit (UK territorial waters) as non-EU/EEA crew only require a transit visa to enter the country and join their ship, rather than permission to work in the UK. DAERA acknowledged that not being able to recruit non-EU/EEA crew to fish within the 0–12 nautical mile limit is particularly problematic for the Northern Ireland fleet because much of its fishing grounds are inside this area. (House of Commons, 2018). Vessels with non-EEA crew are required to fish in areas that can be less productive than the grounds within 12nmiles of port. This regulatory constraint therefore impacts the revenue and efficiency of the prawn fleet.

Media reports of mal-treatment within the fishing sector internationally has led the NI POs to take a lead by working with labour charities to audit the sector and introduce improved practices.

3.4.3 Retention of licenses

Over the last five years the issue of licenses being sold out of NI has become a key concern of the industry, and this is particularly evident in ports like Portavogie, where numbers in the demersal fleet have decreased most. This is a consequence of many of the issues raised above: a lack of investment resulting in a lack of local confidence and clear succession in the demersal fleet. By contrast, the NE of Scotland has a number of skippers and increasingly fishing companies, reflecting a change in fleet ownership structure, that are looking to invest in larger vessels as North Sea whitefish fishing opportunities have improved. These operators are actively purchasing NI licenses to combine with their existing licenses in order to gain the necessary vessel capacity for that growth.

NI operators reaching retirement and with no clear family succession are understandably seeking to maximise the return on this key asset. The demand has increased license prices to over £100 per kW, resulting in licenses worth hundreds of thousands, far more than the price of their ageing vessels. This situation not only depletes the fleet, it raises the initial investment required acting as a significant barrier to new entrants and local operators looking to buy a larger vessel. A further knock-on effect is that it contributes to the problem of old vessels being abandoned within the harbours. There are now several vessels within the NIFHA harbours that are no longer sea-worthy and with prospective buyers are left to fall further into disrepair. These take up space, create a hazard for active port users and ultimately pose a serious pollution risk.

[8] Some examples of successful investment at fishing ports are given here: https://fishingnews.co.uk/awards/shortlists-and-voting/fishing-port/

3.4.4 Access to biological resources

At the time of writing, the future arrangements between the UK and the EU is unknown[9]. In the transition period, the status quo based on relatively stability will continue for quota allocation. The UK's overall share of fishing opportunities under relative stability does not accurately reflect the quantity of fish found and caught within the UK's Exclusive Economic Zone (EEZ) (Defra, 2018). The UK is exploring the best basis for the sharing of future resources, which is expected to be based on 'zonal attachment' be it in relation to landings, bathymetry or swept-area biomass[10]. If such arrangements can be successfully negotiated, for the Irish Sea fisheries that are of primary importance to the NI demersal fleet, this will represent an upturn in quota share. As the Irish Sea quota levels for most whitefish species are at such a low level, this is not expected to have a particularly large impact on landings. However, the importance of Irish Sea *Nephrops*, will mean that a comparatively modest percentage increase in quota would give a significant gain in the volume and value of *Nephrops* landings.

The expectation is that the NI fleet's future access to biological resources will either continue or would some increases if UK negotiations as an independent coastal state based on some form of zonal attachment are successful.

3.4.5 Servicing

The demersal fleet requires a range of engineering support (mechanical, electrical, refrigeration, hydraulics). There are several port-based NI companies that are well-regarded and competitive. Those based in Kilkeel are limited by the capacity of the port and its facilities (onshore space and slipways) and operators have to commission services from outside NI.

In addition to the servicing of active vessels, inactive/abandoned vessels require appropriate decommissioning. End of Life arrangements are not well defined at present: in terms of owner responsibilities and the facilities available for safe disposal of these vessels. This is a current and growing problem for NIFHA, but also represents a business opportunity.

These aspects will be explored in Stage 2 of the report as shore-based ancillary industries are detailed.

3.4.6 Access to buyers

Unlike many fishing areas in the UK, Northern Ireland benefits from the presence of an active processing sector focused on the main product being landed, *Nephrops*. These have located and invested in Kilkeel due to the consistent strength of local landings, with Kilkeel Seafoods (owned by Whitby Seafoods) now Europe's largest scampi producer. Raw material landed by the NI fleet elsewhere, such as Campbeltown when fishing in the Clyde, as well as landings by other fleets, is transported to Kilkeel for processing. There is also scallop and whitefish processing activity in Kilkeel.

Processing of demersal species in Portavogie is now small scale in nature as local scampi factories have closed and the processing sector has consolidated in Kilkeel. Portavogie and Ardglass vessels are now mostly dependent on demand from Kilkeel processors, traded through sales agents such as Denholms. These aspects will be explored in Stage 2 of the report as processing industries are detailed.

[9] It is hoped that EU exit arrangements will be more certain in time for Stage 2 reporting (est. May, 2020).

[10] The percentage of a given stock that lies within the UK's EEZ based on scientific trawl survey data.

4. The Pelagic Fleet

4.1 Biological resources

4.1.1 Description & Status of commercial resources

The most important pelagic resources are mackerel and herring, account for 94% of NI vessel landings of pelagic species by value and 71% by weight. Since 2006, NI vessel catches of mackerel have averaged 12,000t valued at £11.2m, while herring catches averaged around 10,000t valued at £3.3m per annum. Other pelagic species (mainly caught by the largest pelagic vessel) are horse mackerel, blue whiting, sprat and sandeel, but the processors in Northern Ireland do not currently take these species.

Mackerel

Mackerel resources are assessed as one single North East Atlantic stock, with mixing between three defined spawning components (western, southern and North Sea). The stock modelling informing the ICES advice for substantially reduced TACs advised in 2019, was subject to criticism in 2018/2019, resulting in in-year revisions, but the 2020 advice is for a 20% increase. The spawning-stock biomass (SSB) is estimated to have increased since 2007, reaching a maximum in 2014, and has been declining since then. It has, however, remained above MSY $B_{trigger}$ since 2008. The fishing mortality (F) has declined since 2003, but is estimated to have remained above F_{MSY} (ICES, 2019c).

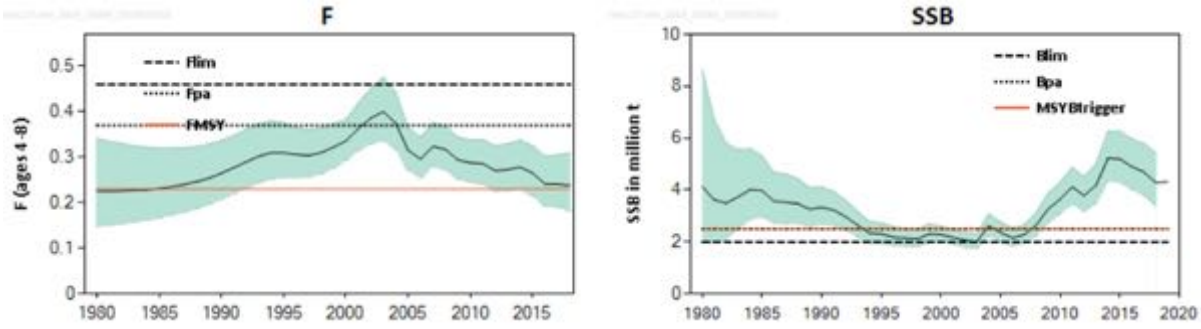


Figure 16 NE Atlantic mackerel fishing mortality (F), spawning stock biomass (SSB) source: ICES, 2019c

The NE Atlantic mackerel stock has been assessed as being in good health, with scientists observing a major stock expansion (rather than redistribution) into more westerly waters. In summary the stock is assessed as being in good health even though fishing mortality is still somewhat higher than the F_{msy} level advised (orange line on left-hand graph in Figure 16). The distribution of the stock has spread westerly and northerly, which is reflected in the surveys (with increased biomass in Greenlandic waters) and catches (with vessels targeting the large shoals to the west of Shetland and NW Scotland. This trend in distribution has informed the long-term investment strategy of the largest European pelagic processor, Pelagia. This also has implications for the future development of pelagic processing in Northern Ireland (see section 4.4).

Herring

Herring targeted by NI vessels is from what are assessed as a number of discrete stocks (albeit with some mixing assumed). Table 6 shows that the proportion of herring from the Irish Sea stock has remained relatively stable, while the North Sea catches have grown in significance in the last five years (45% up from 39% averaged across the 2006-2018 time series) and there is more activity in the Celtic Sea (now 2% of catches).

The latest ICES advice for these herring stocks is mixed, but the Irish Sea and North Sea stocks that account for 83% of recent NI catches are assessed as being at sustainable levels for fishing pressure and stock size. The Celtic Sea herring is not considered to be in a healthy state with fishing pressure above and the stock below sustainable levels. The situation for the West of Scotland stock, which accounts for 17% of the NI herring catch, is uncertain as reference points are not defined in relation to MSY. ICES assess the fishing pressure to be stable, but the stock may be below sustainable levels.

Table 6 Proportion of herring catch by NI vessels by area of capture & latest advice

Herring Stock	ICES areas	ICES Advice		% of NI Catch from each stock	
		Fishing mortality (F) relative to F_{MSY}	Stock size (B) relative to MSY $B_{trigger}$	2006-2018	2014-2018
Irish Sea	Division 7.a North of 52°30'N	✓	✓	38%	38%
Celtic Sea	Divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k	✗	✗	1%	2%
North Sea	Subarea 4 and divisions 3.a and 7.d	✓	✓	39%	45%
West of Scotland	Divisions 6.a and 7.b–c (West of Ireland)	→	✗	22%	17%

Source: DAERA 2019,b & ICES, 2019d

4.1.2 Resource management

Mackerel and herring stocks are resources that are shared between several countries within and outside the EU and this requires international agreement on their management.

North East Atlantic Mackerel is shared between several coastal states (the EU, Norway, Faroes, Iceland and recently Greenland) as well as fishing nations such as Russia within the international waters covered by the NEAFC convention. There is an ongoing problem with mackerel management as these states cannot agree on the allocation of resources. Most agree to work with the ICES advice provided on the stock, but only the EU, Norway and the Faroes have signed a coastal states agreement on the allocation. These states have set 15.6% of the quota aside for 'other fishing parties', but Iceland, Greenland and Russia are setting their own quotas unilaterally that far exceed this amount. The result

is a Total Catch that has consistently exceeded the quota advised by ICES, amounting to around 130% of the TAC in recent years.

Several national mackerel fisheries, including those for Northern Ireland fishers, were MSC certified, but the recent ICES advice and the lack of effective international agreement via the Coastal States Agreement led to the MSC certificate being suspended early in 2019 and that suspension remains in place despite the improved stock advice for 2020.

For herring, the key stocks for the NI fleet are managed under the EU Common Fisheries Policy (CFP). Entitlement to quota for Irish Sea herring is shared between the UK (including Northern Ireland) and Ireland, under the terms of the CFP (74% to the UK and 26% to the Republic of Ireland). In most instances, the Republic of Ireland has traded its quota to the Northern Ireland Fish Producer Organisation (NIFPO) overseen by the Department of Agriculture Environment and Rural Affairs (DAERA), within the UK wide quota management system.

A similar arrangement exists for Celtic Sea herring, where Ireland accounts for most of the catch. The Pelagic Advisory Council (PelAC) has been actively pursuing a rebuilding plan for Celtic Sea herring in light of the results of the inter-benchmark and most recent assessment. In order to support future stock assessments, the PelAC is seeking advice on the relevant timeframe for any fishery, the geographical areas where each fleet should operate, and a level of catches that would not impair the recovery of the stock but would be sufficient to allow collection of fisheries-dependent data (ICES, 2019c).

The fishery for North Sea herring spans the European Union (EU) Fisheries zone and the Norwegian fisheries zone. This shared resource is managed through a joint management agreement between the EU and Norway that was established in 1980 and is reviewed annually (see for instance, EU-Norway 2014). The EU Norway Agreement is implemented through national and EU legislation within the fisheries zones of its contracting parties.

4.1.3 Future prospects

The international dispute over mackerel quota is likely to continue for some years to come. The introduction of the UK as an independent coastal state into the discussions will further complicate matters as the UK claims a re-consideration of TAC share based on some form of zonal attachment. Napier (2018) estimated that just over 1 million tonnes of pelagic fish were landed from the UK EEZ in 2016, with an estimated value of about £675 million. UK vessels accounted for 35% of that value; other EU vessels accounted for 50%, Norway 11% and the Faroes 4%. This points to the UK looking for a substantial net gain in pelagic quotas based on zonal attachment. However, current fishing patterns for this widely distributed stock are a product of reciprocal access: other fishing nations could fish more of their quota outside the UK EEZ.

For highly migratory and widely distributed stocks such as mackerel and to a lesser extent herring, there is difficulty and risk in arguing for shares to be based on the extent of the resource in your own EEZ. As mackerel stocks migrate through the waters of several nations, all could argue for more of the TAC. In October 2009, North Sea mackerel appeared to have moved away from the Norwegian Sector and Norwegian vessels attempted to follow the fish westwards resulting in disagreements over permissible catches by Norwegian boats in Scottish (EU) waters (see Fishing News, 9th October 2009). Shortly after, Iceland and the Faroe Islands unilaterally claimed quota for mackerel (146,000 and 150,000 tonnes, respectively, in 2011; or 46% of total catches), since the species had suddenly attained high abundance in their territorial waters for the first time (MCCIP, 2017).

Catches in the UK EEZ have recently been the largest compared to the EEZ of other nations as the resources, particularly the supershoals of mackerel, are in good condition and accessible when moving east to west around the Shetland Islands. The expansion to the north and west, with more mackerel being found as far west as the Greenland EEZ shows that these patterns change over time.

Herring stocks, which lay their eggs on certain defined grounds, are more geographically distinct. There are observed changes and mixing between the stocks as currently defined, creating some uncertainty over what the most appropriate stock management units are.

Arguing for a greater share of pelagic resources should of course result in a major increase in the scale of NI pelagic catches, and to an extent more NI landings. The majority of UK FQAs are held by the Scottish pelagic fleet, but a proportionate increase would still be beneficial to the NI fleet, which certainly has the capacity to take up such an increase. The UK fleet holds 74% of Irish Sea herring quota and with swaps caught 80% of the TAC 2018 (ICES, 2019c) and Irish vessels also land catch from this fishery to NI processors so the gain for NI processors is not likely to be huge unless catches from other fisheries can be attracted.

Some suggest that any increased quota could be allocated in a different way to the FQA holdings, such as favouring those landing into the UK, or on a community basis. The scale of any increased share and the method for its allocation are unknown, but future fishing opportunities for the NI fleet could be expected to be at the very least the same as current share arrangements, with the potential for more if negotiations are positive.

4.2 Fishing Activity

On average the NI pelagic vessels land just under 32,000t of pelagic species per year. It is assumed that around 7,000t (30%) of mackerel and herring goes to NI processors. The remainder is landed into Norway, Scotland (Shetland and Peterhead), Ireland (Killybegs) and Denmark.

Table 7 Pelagic landings by the NI fleet by port nationality

	Average 2006-2018			
	Herring & mackerel		**All pelagic species**	
Norway	4,673	21%	6,572	21%
Northern Ireland	6,922	31%	6,943	22%
Scotland	3,846	17%	4,015	13%
Republic of Ireland	3,893	17%	8,002	25%
Denmark	3,202	14%	6,572	21%
total	22,537		31,750	

Some blue whiting, horse mackerel and sprat is caught by the largest pelagic vessel, which is landed for processing in Skagen (Denmark) or Killybegs as NI processors do not process species. The two pelagic pair trawlers hold horse mackerel FQAs, but look to swap these out for more Irish Sea herring.

This has been less available in recent seasons as Irish vessels have fished the quota themselves, particularly with the poor status of Celtic Sea herring.

The figure below presents landings of herring and mackerel by the NI pelagic fleet, i.e. filtered for vessels >45m, the 3 large NI pelagic vessels.

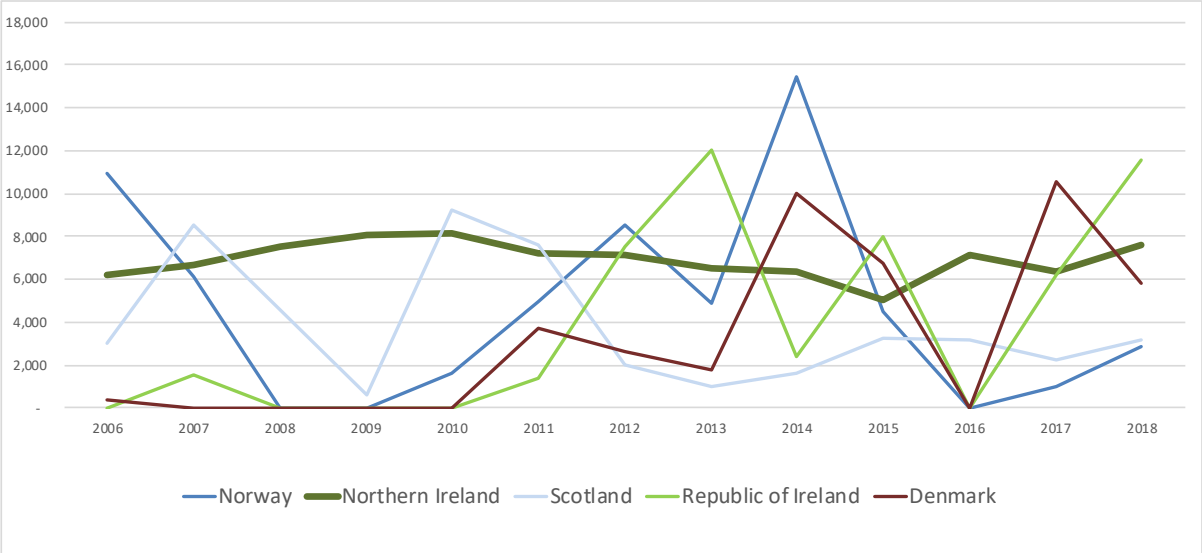


Figure 17 NI vessels herring & mackerel landings (t) by port nationality (t) 2006-2018 (source: DAERA,2019b)

As Figure 17 shows, the landings into Northern Ireland have been comparatively constant at 6 to 8,000t. Landings into Norway, Scotland, ROI and Denmark have fluctuated considerably. Up until 2014, most of the NI landings, around 5,000t was landed at Ardglass, but since 2016 the NI pelagic vessels have landed into Belfast and transferred fish to the Ardglass and Kilkeel processors. Ardglass still receives some direct pelagic landings from the smaller ROI pelagic vessels.[11]

Figure 18 maps the landings per year per port and the ICES rectangle in which the species were caught. These are highly seasonal fisheries that follow a cycle even if the landing location changes:

- January: the **mackerel** from west of Shetland/west of Scotland is landed into Killybegs and Belfast;
- February & March: **blue whiting** from West of Ireland landed into Killybegs and Skaagen, Denmark;
- August to October: the **Irish Sea herring** was landed into Northern Ireland;
- August to October: the **North Sea herring** fishery, started around Shetland and landed into Norway and Denmark, before moving south when herring caught to the west of Orkney and mackerel to the east of Orkney were landed into Killybegs. In October, mackerel and herring caught to east of Orkney was landed to Skaagen, which may be linked with vessel maintenance needs at the end of the season.
- December to February: **horse mackerel** from West of Ireland is landed into Killybegs.

Additional maps illustrating these pelagic fishing patterns are presented in Appendix E: NI Pelagic Fleet Activity.

[11] There is also a very small scale net fishery for Irish Sea herring, which County Down inshore boats used to switch to during this brief August-October fishery, but now this only involves very few boats landing into Kilkeel.

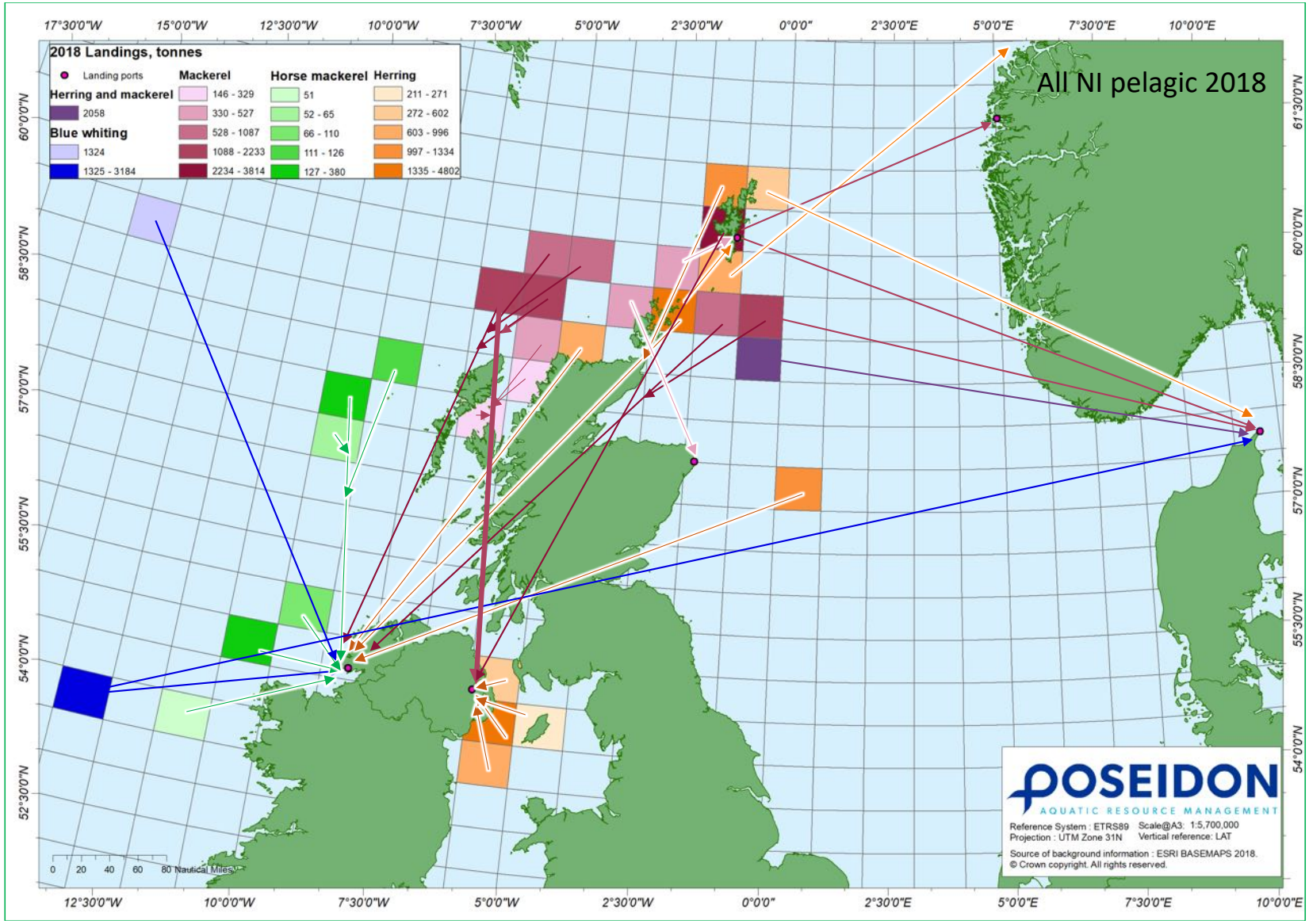


Figure 18 Landings by NI pelagic vessels in 2018 by species, location and landing port (source: DAERA)

4.3 Vessel trends

The pelagic fleet is highly advanced with a move to larger vessels evident in the NI fleet. The three vessels were built in 1999, 2005 (both purchased second-hand and entering the NI fleet in 2016) and 2017 (from new), which reflects a scale of investment that is not apparent anywhere else in the NI catching sector. The replacement vessels are all significantly larger than the vessels they replaced and cannot routinely and safely land into any of the NIFHA ports.

The catching efficiency for small pelagic fisheries is the highest of all fisheries, with shoals being targeted mid-water with no contact on the seabed and very little by-catch. There is therefore no pressure to radically change fishing operations for economic or environmental reasons.

The cost of retrofitting scrubbing systems to the engines is substantial and there is no regulatory requirement to do so as yet. Unless tighter regulatory requirements are introduced, reduced emissions are expected to come over time as engines are replaced with newer, more efficient models.

4.4 Issues & Opportunities

The key issues for the pelagic fleet are:

a. where they land and berth the vessels;
b. where the catches are processed; and
c. where servicing and repairs can be provided

Landing and berthing

The draught of the two 51m long vessels is 7.5m when fully laden and the largest in the fleet, is 86.4m long with a draught of approx. 8.5 metres[12]. Skippers of these large vessels want to avoid the vessel making bottom contact as this makes the vessel less stable and can cause damage. The sonar and various other sensors are located at the front of the keel and there is a risk these are damaged if the vessel makes contact with the bottom, particularly on hard ground. Any unforeseen delay can make it impossible to get in and out on a high tide and skippers are reluctant to risk this situation.

As well as depth constraints, there is not sufficient room to safely receive and provide berthing for the vessels in the NIFHA ports. With relatively short fishing seasons, particularly for the pair team that only target herring and mackerel, these vessels are tied up for the majority of the year. The largest vessel fishes more days as it also targets other pelagic species such as blue whiting and horse mackerel.

None of the NIFHA fishing ports can receive the three vessels. The two smaller vessels (both over 51m) operate as pair trawlers and have landed to Warrenpoint, Bangor and most recently to Belfast. There was a landing to Ardglass, but there were several practical constraints in terms of navigation, access and quayside space, which were of concern to the skippers. Manoeuvring the vessels is very challenging, particularly when fully laden. The difficulties for vessels of this size, not least concerns over crew safety, mean that the current preferred landing and berthing location is Belfast.

[12] As indicated in the KSP business plan (2016)

Belfast has sufficient space for the vessels with very safe berths. When fish is landed, temporary quayside space is provided for unloading the catch to tankers. There is a 30 mile journey to the two Ardglass processors, taking one hour, and a 45 mile journey to the Kilkeel processor (1 hour 20 mins).

Figure 19 The NI pelagic pair trawlers berthed in Belfast, November 2019

A minor downside of the current arrangements mentioned by the industry is social: rather than landing into 'home ports', the NI-based crews must travel back to County Down. Being flown back from further afield such as Skagen is inconvenient, but clearly does not impact the viability of this highly profitable venture.

A comparative analysis of the non-NIFHA ports where the pelagic fleet has landed (Belfast, Bangor, Lisnahally and Warrenpoint) is presented in **Appendix G**.

Processing

The majority of the pelagic pair's landings are to the NI processors. Nearly all the Irish Sea herring is landed on a daily basis in relatively small 150-200t landings as this is the maximum the factories can handle and to maintain the quality of the herring (skipper pers. comm.). The vessels have the capacity to land up to 600t, but this is only achieved during the mackerel fishery as the fish is more robust than herring and the landings may be to factories in Scotland such as Pelagia in Lerwick that can handle this scale of landing.

The largest pelagic vessel lands to NI less frequently, which is a consequence of the capacity of the vessel in terms of where it can land to and where it is serviced. Individual landings from this vessel are large (400t or more) and the buyers must have factories of a sufficient scale to receive the catch. Some of the vessel's catches are of industrial species that are processed for fishmeal/fish oil in Killybegs, Shetland or Skagen. It is processor demand for the scale and type of fish being caught that results in landings to these ports.

As highlighted in the Kilkeel business plan, it is not only the capacity of the port that must be increased for the largest pelagic vessel. For NI to be a viable landing option for this vessel, the scale of NI processing capabilities must increase to accommodate its catch volumes. There is interest in Joint venture arrangements for establishing a new pelagic processing facility, including interest from the owner, who estimated that to process 400 tonnes a day of pelagic fish would require £7m investment and 30 jobs, with significant investment in cold storage (which would be a key cost) (KSP, 2016).

The size of the processing facility suggested in the KSP business plan is twice that of the Ardglass operators that rely on raw material delivered by tanker, even for Ardglass-landed fish. To be efficient and so competitive in this international market, the location of such as facility is critical; both in relation to the resources and where the vessels land. Direct pumping of catch from quayside to factory is preferable, particularly for the scale of landings and so also for the facility envisaged. This means that to support landings in Kilkeel by the largest pelagic vessel, the development would require that the port be sufficiently large and deep, as well as adequate quayside development space for a pelagic factory of sufficient scale.

The European pelagic processing industry suffers from overcapacity and is not particularly profitable (Havsea, 2017). The Havsea report also notes that 'Kilkeel is not the most natural geographical location for a new pelagic processing plant' due to the current distribution of the mackerel stock and North Sea herring fisheries. However, the report does suggest that these issues could be overcome through vertical integration with the pelagic fishing operations, which is evident in other UK pelagic interests like Lunar and Interfish. These are facing stiff competition from a growing international conglomerate, Pelagic, which is now the largest pelagic processing company. It is not vertically integrated in terms of vessel-ownership, but does have numerous factories processing pelagic fish, meal, oil and salmon trimmings. It has multiple facilities along the Norwegian coast and purchased the fishmeal & fish oil operations in Aberdeen, Grimsby and Killybegs. Pelagia acquired a majority holding in Shetland catch in 2017 and has an ongoing strategy to consolidate facilities around processing hubs (locations which have both food and feed capabilities).

Servicing

The third issue to consider is the servicing of these vessels. These large vessels have limited options for their servicing requirements. All employ their own engineers, but specialist mechanical and electrical engineering support is regularly needed. where possible. If van-based repairs are sufficient, the pair trawlers can look to Kilkeel-based engineers. For more extensive repairs and maintenance, dry-docks or suitably large slips are required. Dublin port dry-dock is now closed so the only Irish Sea east coast option is Harland & Wolff (H&W). The long-term future of H&W is in doubt and is not targeting fishing sector business; when there are other orders, there may not be space for fishing vessels. Two of the vessels use the dry-docks in Skagen, Denmark, which operates as a processing and servicing hub with all the required service industries on hand.

Summary

There is a co-dependence for the expansion of pelagic landing capacity and pelagic processing in Northern Ireland. To achieve added-value benefits identified in the KSP business plan associated with the largest pelagic vessel, both port capacity and processing capacity must be established. With the introduction of larger scale processing capacities, comes increased competition for raw material in NI and the likelihood of displacement from current operators. The most logical solution would be a joint venture between those current operators and pelagic vessel owners to ensure this displacement can be addressed, but this is a business decision that is beyond the ability of the public sector to dictate.

Landing by the two 51m pelagic vessels is not reliant on additional processing capacity as they already land most of their catch to the NI processors. The net gain from accommodating these two vessels would be some additional spend in the NI economy from ancillary services servicing and maintaining the vessels. However, this is dependent on the scale of port facilities, such as the slipways, being expanded to enable these vessels to be serviced in the port.

5. The Inshore Fleet

5.1 Biological resources

5.1.1 Description & Status of commercial resources

Awaiting AFBI stock assessment advice – November 2019

The main inshore stocks targeted are brown crab and lobster. There is also a lower level of pot fishing effort for velvet crab, whelk, palaemon prawn and *Nephrops* (in Strangford Lough) as well as seasonal netting for herring (into Annalong and Kilkeel).

In general terms, the brown crab stocks are showing clear signs of overfishing, driven by increased effort due to a significant increase in prices in 2018 (see below).

Lobster stocks are reported by fishers to be in good shape with good catch rates and a good range of sizes on the grounds.

5.1.2 Resource management

The Inshore Fisheries Review undertaken by AFBI in 2012/13 identified the following main issues (AFBI, 2013):

- Lack of management focus on the inshore sector
- Environmental protection obligations under the Northern Ireland Marine Bill
- Lack of data available for the inshore fleet
- Spatial pressures with competing fishing and non-fishing (marine energy developments and MPAs) interests.
- Sustainability of stocks

The review was consulted on widely and resulted in an Inshore Fisheries Strategy. Since then, a multi-stakeholder group, the Inshore Fisheries Partnership Group (IFPG) has been established. It was proposed that the main roles of this group will include (DARD, 2014):

- Improving communication and transparency regarding the management of inshore fisheries;
- Considering the need for local management plans;
- Promoting the sustainable development of the sector;
- Identifying ways to maximise economic returns for fishermen;
- Identifying data gaps and making recommendations on priorities for scientific research to support management decisions;
- Providing advice on legislative and compliance issues, including the need to introduce new legislation; and,
- Developing and promoting voluntary codes of practice.

While the IFPG has met regularly, improving communication relating to inshore fisheries, and the scientific knowledge base has improved for key inshore stocks, the improved management of inshore fisheries is still to be delivered.

Improved management of the potting sector is necessary to address the poor state of crab stocks, which has been known to fishermen and was recently confirmed by AFBI's stock assessment. The lack of management and speculation over future management is exacerbating the problem as fishermen land more crab to build track record that might be used as a basis for future allocation of fishing opportunities.

DAERA recently consulted on proposals for additional Brown Crab management measures. There is almost unanimous support for an increased minimum landing size (MLS) to 140mm carapace (up from 130mm) and for some form of effort management, such as pot limits, (rather than output controls such as quota). Determining the most workable way of introducing a new effort management regime will require more discussion, but the Inshore Fisheries Partnership (IFP) meeting in October 2019 clearly highlighted the strong will of industry for increased management to be introduced as soon as possible.

5.1.3 Future prospects

As the inshore shellfish stocks are considered to be discrete stocks within the inshore waters of Northern Ireland, future resources are expected to be fully allocated to the NI fleet as they currently are. The management of inshore resources is wholly under the devolved powers of DAERA as the Northern Ireland government department responsible for fisheries management and environmental protection. The latest discussions within the IFP indicated that some improvements to inshore management resulting from the 2019 consultation on brown crab management measures may be imminent. Given these recent developments, it is hoped that the future prospects for inshore fisheries are positive.

The implications of climate change on these stocks is not certain. Ocean acidification is certainly an issue that impacts shell-forming species, but the pace of change may enable most species to adapt to these changes in conditions. The fitness and survival of commercially important shellfish may be at risk from ocean acidification, including species- specific impacts on their immune systems and energy trade-offs[13]. There is also the possibility of non-native species becoming established as waters warm, which could provide both challenges if existing commercial species are displaced and market opportunities.

5.2 Fishing Activity

Two sub-sectors of the NI inshore fleet are evident, with an unofficial boundary between the two at Belfast Lough:

1. the **Down fleet**, accounting for the great majority of vessel numbers and activity with vessels concentrated in the NIFHA fishing ports, but also Annalong, Portaferry and other landing points along the County Down coast.

2. the **North Coast fleet,** twenty or so inshore vessels widely distributed around small ports and landing points on the North Coast around to Belfast Lough and a further ten under 10m vessels (plus two NI-registered over 10m potters) operating from Greencastle, Co. Donegal.

[13] https://www.oceanacidification.org.uk/Oarp/media/images/PDF/UKOA-Fisheries_Foodwebs.pdf

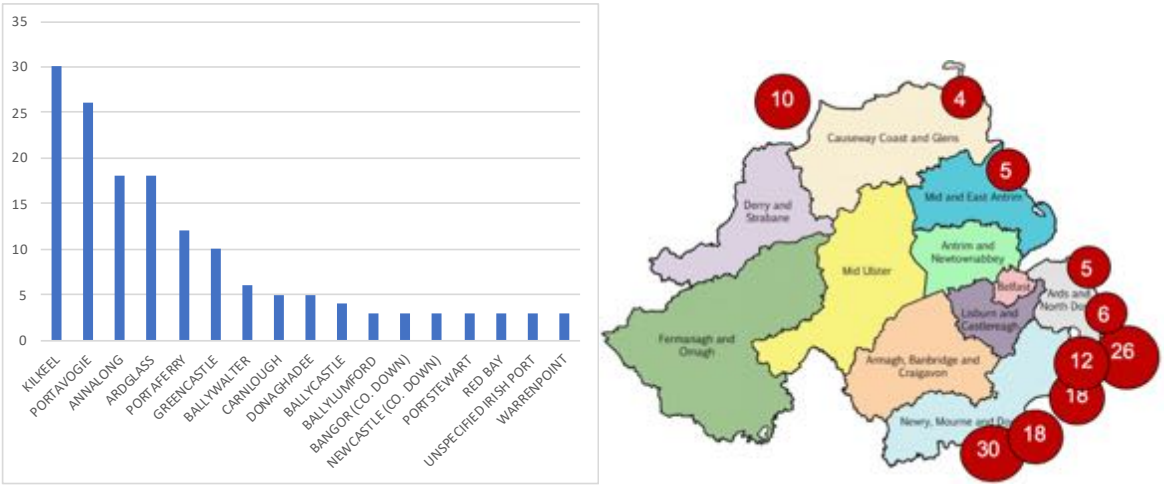


Figure 20 NI ports with three or more under 10m vessels registered as home ports. Source: MMO, 2019

The last ten years has seen an overall decrease in inshore fleet numbers, but some ports such as Ardglass have seen increased vessel numbers as the Down fleet consolidates.

The total number of under 10m vessels in the Northern Irish fleet is 194(MMO,2019). Of these, 185 are Belfast registered, with a handful operating from ports in the Republic of Ireland (mainly Greencastle in Donegal) and a couple registered in Campbelltown, but operating from Kilkeel.

The last ten years has seen growth in the inshore fleet as some skippers of larger vessels selling up and investing in inshore vessels, but following a peak of 234 in 2013, there has been a year on year decrease in the under 10m fleet to just under 200 vessels. In the County Down area there has been a concentration of numbers in the NIFHA ports of Portavogie and Ardglass. On the north coast the inshore fleet remains dispersed around numerous landing points, including the eight harbours operated by the Causeway Coast and Glens Borough Council.

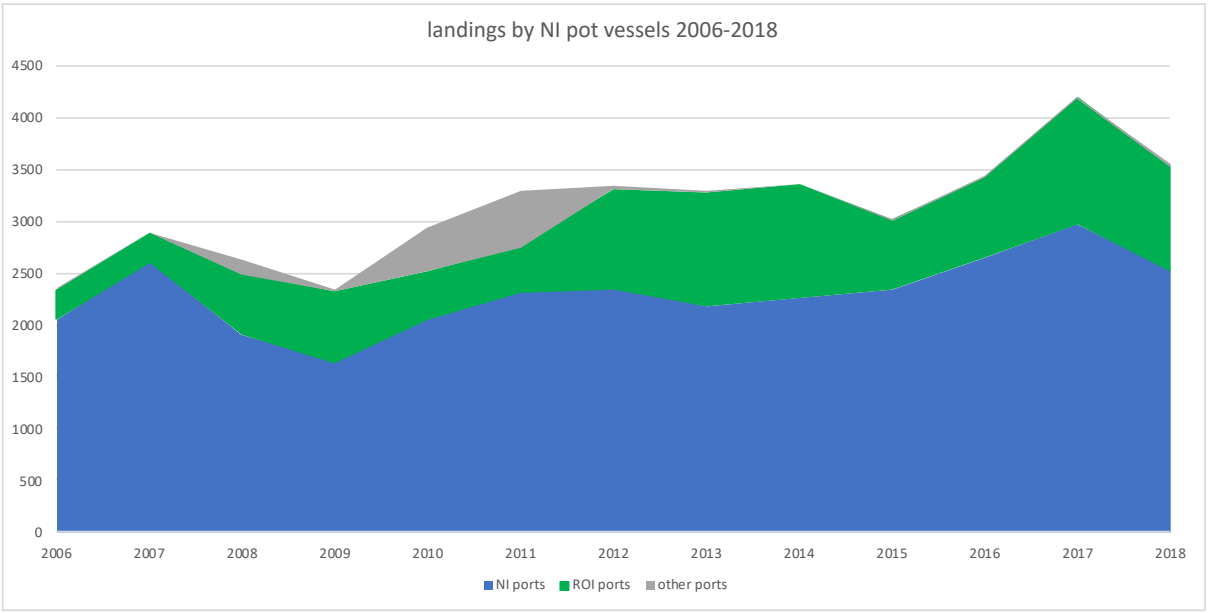


Figure 21 Landings by NI potting vessels 2006-2018 (tonnes). source: DAERA

As Figure 21 shows, a quarter of landings from NI potting vessels over the last 10 years has been into ROI ports and this has increased somewhat in recent years. This is mainly the result of the very few over 10m NI-registered potting vessels that operate from Greencastle. The amount of landings from

under and over 10m vessels was similar for many years, but since 2016 the landings by the over 10m 'supercrabbers' has grown significantly (Figure 22).

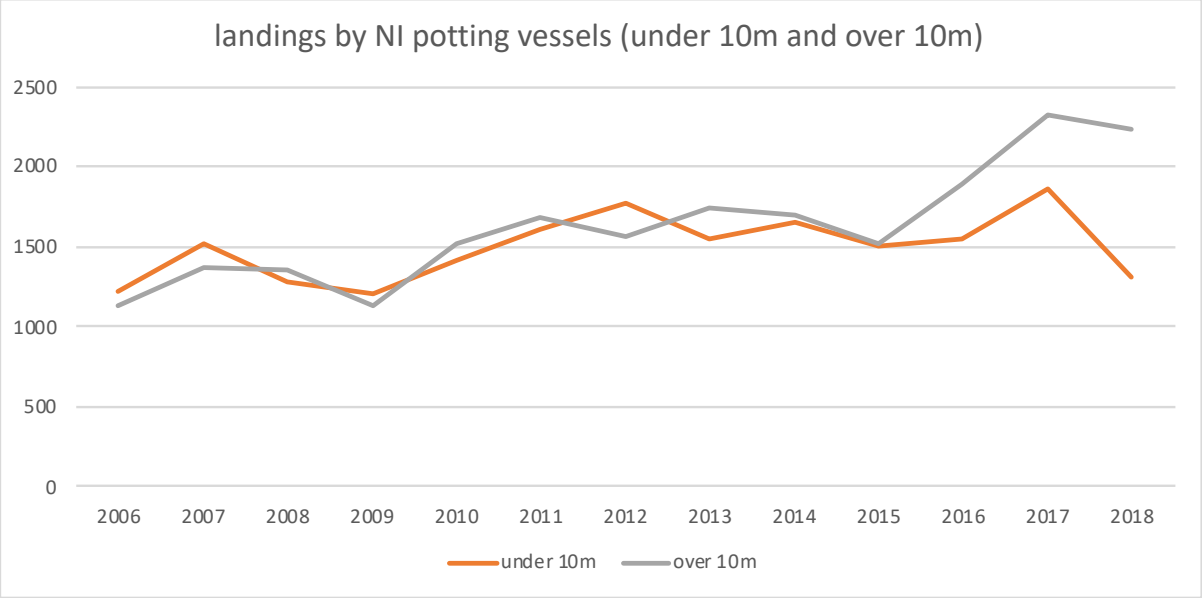
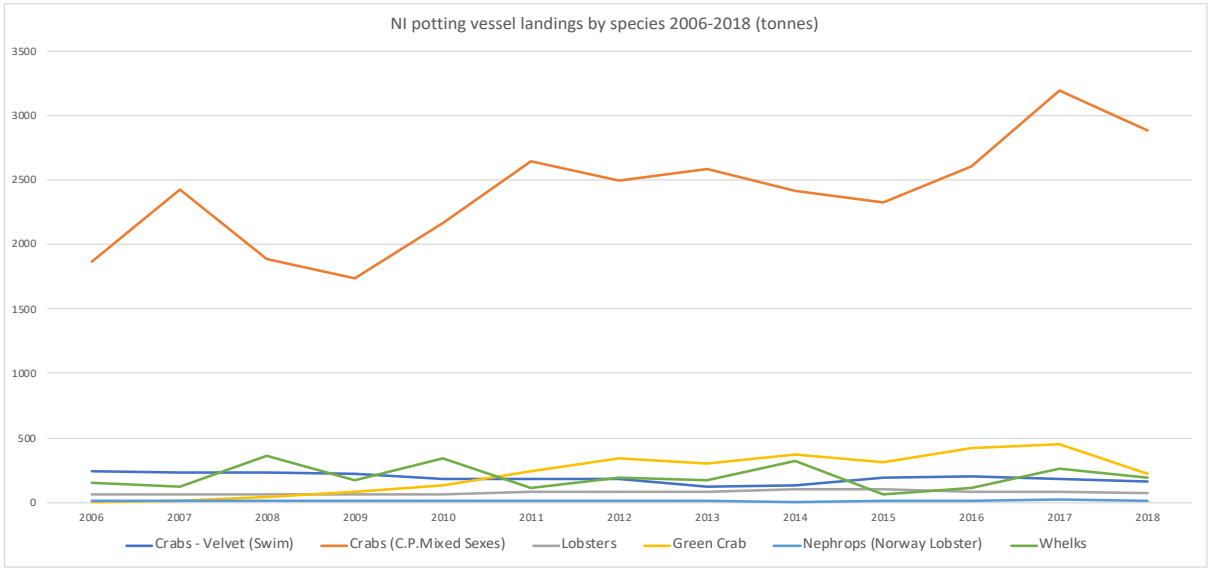


Figure 22 Landings by NI potting vessels under and over 10m 2006-2018 (tonnes) source: DAERA

The total landed value by NI potting vessels has grown by significantly over the last 10 years, rising from around £3million up to £4million and in the last two years the growth in landings by the 'supercrabbers' saw total value rise to £6million in 2017. The substantial price increases for crab in 2018 resulted in an increase in total value to just over £8million in 2018 (despite a slight decrease in crab landings, Figure 23).



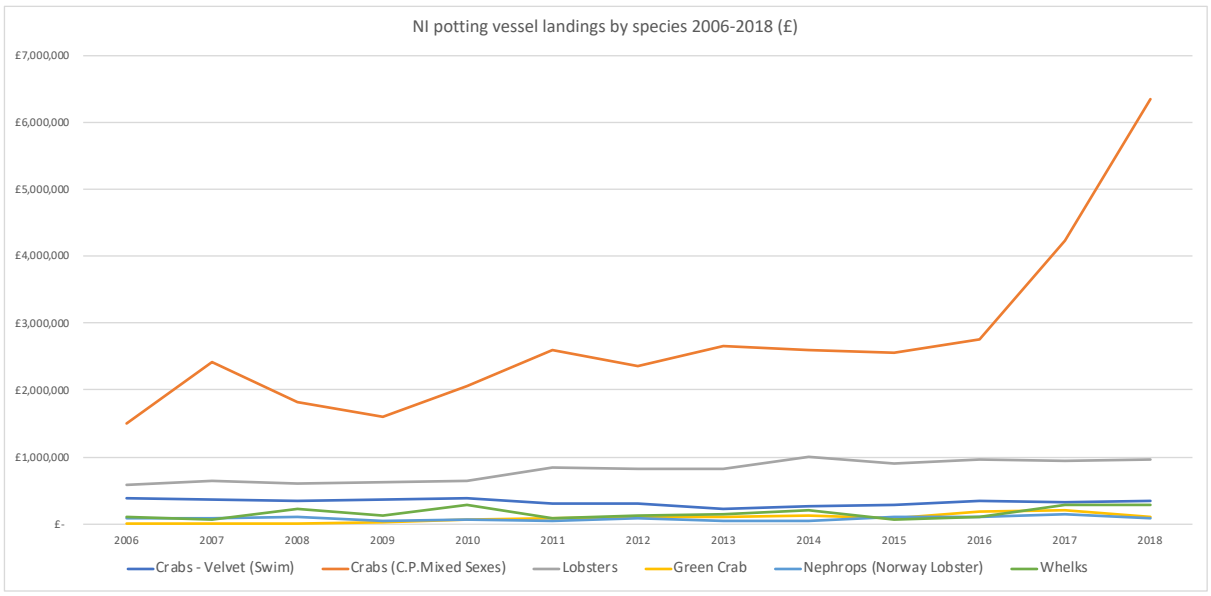


Figure 23 Landings by NI potting vessels by species, 2006-2018 in tonnes (top) and £ (bottom) source: DAERA

The graphs of landings by species show the importance of crab to the inshore fleet with landings growing to around 3,000t compared to 2,000t ten years ago. It is the recent growth in the value of crab due to price increases that is most noticeable with crab landings in 2018 valued at £6.3m compared to the average since 2006 of £2.7m.

Lobster is also a catch that has grown in value at around £1m with relatively stable landings of around 80 tonnes, while velvet crab has fluctuated with 2018 showing 160t compared to an average of around 200t valued at £325,000. There has been significant growth in green crab landings with over 400t landed in 2016 and 2017 (a decrease in 2018) but this low value species only contributed an average of £85,000 per annum. Other species landed by pots include whelks, which average just under 200t per annum, but this has fluctuated year to year, and a small tonnage (av. 12t per annum) of creel-caught Nephrops, mainly from Strangford Lough where trawling is no longer permitted.

Comparing the numbers of under 10m vessels to the catch by this fleet segment over the last 10 years shows that there is a strong negative correlation coefficient (-0.74) between the number of under 10m

vessels and the average catch per vessel (around 13t per vessel over the period). When the fleet numbers peaked at 234 in 2013, the average catch in 2013 and 2014 dropped to just over 10t per vessel. Since then a decrease in the under 10m fleet overall has resulted in landings per vessel that are above the average for the last 10 years.

The strong reliance on crab, and shellfish more generally is very evident. On a very small scale is a seasonal inshore net fishery for herring by vessels fishing out of Kilkeel and previously Annalong (Figure 24), averaging 65t per annum, which has decreased substantially in recent years with inshore fishermen less interested in this very brief switch to netting in October/November. There are also very small amounts of mackerel and other finfish caught on a seasonal basis by the under10m fleet.

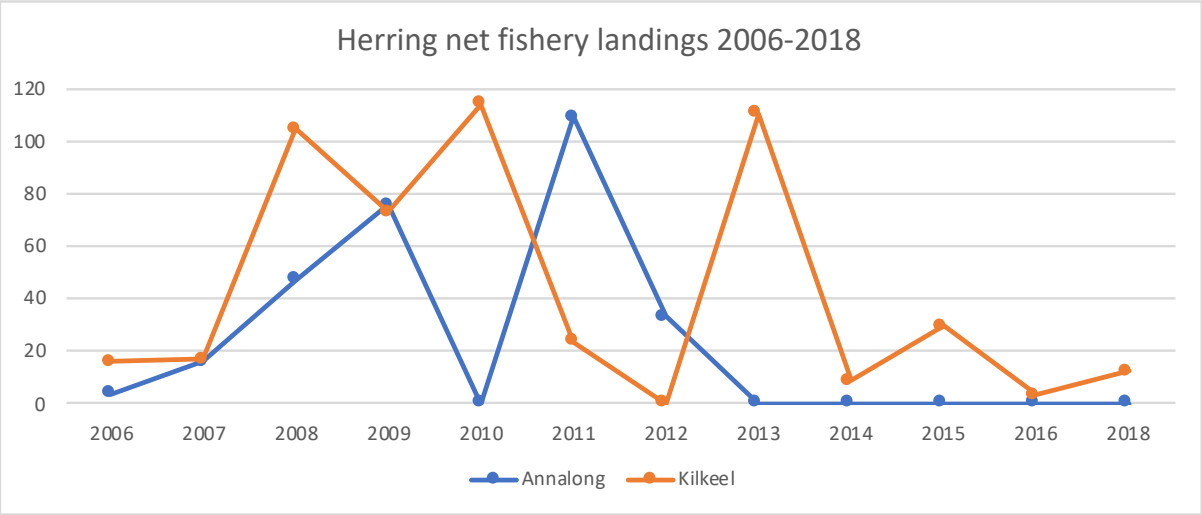


Figure 24 Landings from small scale herring net fishery (tonnes) source: DAERA

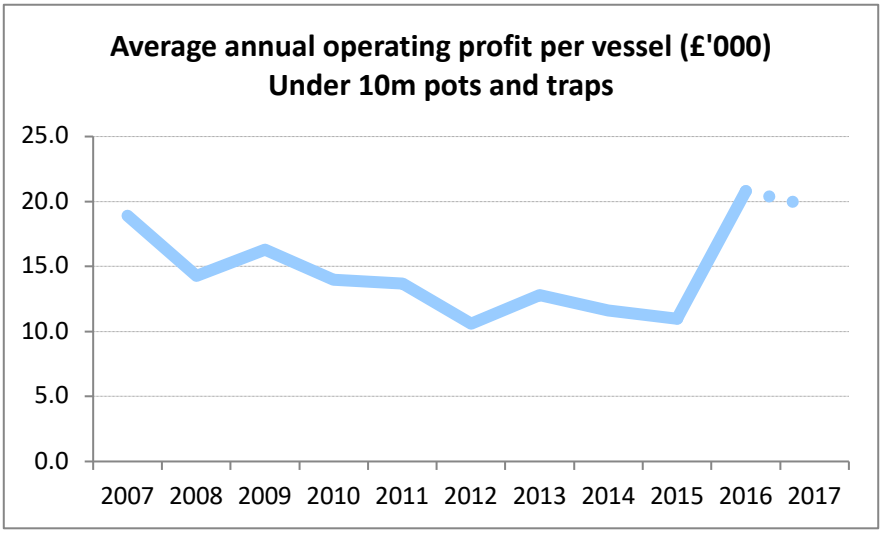


Figure 25 Average annual operation profit per vessel in the UK under 10m pots and traps. source: Seafish, 2018

The average operating profit for under 10m potting vessels is positive, but marginal. It decreased to just above £10,000 per annum between 2012 and 2015, but has since risen to around £20,000 and could be expected to have increased significantly with the major crab price increases in 2018.

5.3 Vessel trends

The under 10m fleet, as with the over 10m fleet, is relatively old with more than three quarters of the under fleet being over 20 years old and 60% being between 20 and 40 years old. While this is indicative of limited investment, over 80% of the fleet is now fibreglass hulled, which is long-lasting and can be easily repaired. The high capital cost of a new vessel is understandably off-putting for operators in these small scale fisheries that have seen returns fluctuate. The recent high crab prices could however result in more investment, including an increase in catching capacity.

There is some discussion at UK level whether the distinction between requirements for vessels under and over 10 metres will remain as this is an arbitrary threshold that influences vessel design; maximising catching capacity up to 9.95m. Irrespective of if the under 10m/over 10m designation remains, the beamier dimensions of the new inshore vessel designs suggest that the port and quay space required per vessel will increase.

A popular choice in inshore vessels is a Glass Reinforced Plastic (GRP) fibreglass hulled catamaran, which is light weight and has a wide beam to maximise stability and available deck space for pot handling and storage. Fibreglass is hard-wearing with relatively cheap repairs, which in many instances can be done by the vessel owners themselves.

Another trend is an increase in speed. A ‘fast potter’ allows more gear to be worked as the steaming time getting to and from strings is reduced. Faster, more efficient engines combined with lighter weight hulls allows this increase in speed without such an increase in engine power and fuel use.

The modern designs are intended to allow flexibility in operation and gear choice: switching between a range of passive gears is possible, but switching between potting and inshore trawling or scalloping is less feasible with the new vessel types. Even where it is operationally possible for a vessel to switch to mobile gear, environmental management restrictions on mobile gear will increase in the future, making it less likely that inshore trawling will remain an option for the inshore fleet.

A further development is the level of technology on board inshore vessels, which not only enables vessels to track and locate gear, but also enables management agencies to track inshore vessel activity. This is becoming increasingly important as management measures are applied to Marine Protected Areas (MPAs) and, in the context of marine developments such as renewables, it becomes increasingly important for fishers to show what sea areas are important to their fishing operations.

These developments represent a change in approach to the inshore fleet. Previously inshore activities were known, but not measured or closely managed (e.g. no VMS and minimal reporting requirements) and this lack of attention was attractive to many in the inshore sector.

Today, inshore fishing fleets are recognised as important contributors to the socio-economic coastal communities. While the inshore fleet is likely to operate passive gear, which has less environmental impact, the impacts should nevertheless be considered. Localised depletion (be it from a growing inshore fleet or from larger visiting vessels) has shown that there is a need to ensure appropriate management for inshore stocks. With that improvement management comes improved monitoring and over the coming years, it is expected that inshore fleets will be fully integrated into management requirements.

5.4 Issues & Opportunities

Following a rise in the number of under 10m vessels between 2008-2013, the inshore fleet has continued to decrease to just below 200 vessels. While long-term trends suggest this is a relatively sustainable level in terms of vessel numbers, it does accurately reflect overall fishing effort.

There are reported increases in the number of pots being fished per boat as well as increases in the number of vessels operating in certain areas. The increases are driven by higher crab prices in 2018 (high demand from the Chinese market, pushing up prices throughout Europe) and efforts by some to record higher landings in anticipation of future management measures referring to historic track record.

There is wide-spread concern that the current level of activity is not sustainable and additional management controls are needed. Some form of overall effort control is required, alongside measures to ensure berried individuals are returned. The introduction of these management measures is also an opportunity to increase the security of fishing opportunities for the inshore fleet, removing the risk of larger vessels opportunistically fishing out local resources.

The distribution of the inshore fleet around numerous ports makes it difficult for appropriate, targeted investment in any one location. There are a few pockets of concentration, namely the three NIFHA ports along with Annalong and Portaferry where some centralized infrastructure such as bait and gear storage may make sense. With catch being sold live, storage is mostly in sea cages and catch transported direct to vivier lorries at agreed collection points or to NI buyers with their own holding tanks. The main demand of an inshore fleet is for adequate well-protected and accessible berths with basic services (electricity and fresh water) to load, off-load and tie-up. The lack of space can be particularly acute in the summer months when inshore activity and tourism activity are both highest.

The growth of the inshore fleet at Ardglass means that there is no longer sufficient suitable space within the port and investment to support this fleet in the form of pontoons and developing a dedicated inshore fleet area (e.g. Sawpit) may be required. An options study is currently underway for Ardglass Development Group to explore this and other port development options.

The inshore fleet in Kilkeel is also affected by the general over-crowding, as well as the operational constrains caused by the difficulties in entering and exiting the port. While water depth is less limiting for the smaller inshore vessels fishing passive gear, they are more affected by weather conditions and would opt to not go fishing if the weather is forecast to be unfavourable.

A comparative analysis of the NIFHA ports is presented in **Appendix G**.

The inshore fleet on the north coast is also heavily constrained by the weather, with many only operating seasonally as a result. Many fishers must therefore find alternative employment when fishing is not possible, creating income insecurity.

6. Conclusions & Recommendations

6.1 Conclusions

6.1.1 Economic Context

- The Northern Ireland economy continues to lag behind the rest of the UK in terms of GVA, productivity and wage levels. Since 2009 the annual average growth rate has been around 1.2% in the UK compared to only 0.1% for Northern Ireland.
- Northern Ireland's agri-food sector has grown substantially over the last 20 years. Seafood (making up 2.8% of export sales by the food and drink sector) has not experienced the same growth rates as some agri-food sectors.
- The Northern Ireland seafood industry continues to grow in value based on relatively stable volumes of shellfish and demersal species landed into NI ports (pelagic species fluctuate more) and in recent years employment in catching, processing and marketing has seen a 10% increase.
- There will be more emphasis on conserving the marine environment. Future management will see additional spatial constraints placed on bottom fishing (trawl and dredge), which account for the majority of landed value. The displacement of fishing effort should be relatively localized and so would not have significant long-term impacts on the landed value into NI ports.
- Brexit could benefit the NI seafood industry (a moderate increase in landings if the UK can negotiate a greater share of resources key to the NI sector, i.e. *Nephrops*), but there may be challenges related to the NI Protocol and its potential impacts on east - west movements of fish and fish products.
- Climate change brings consequences for the seafood industry with changing species distributions and the need to upgrade infrastructure to account for impacts from more extreme and frequent storm events and sea level rise.

6.1.2 The fleet

- A growth in landings in the 70's led to fleet expansion in the 80's, but the fleet has since contracted to pre-expansion levels. The last 10 years has seen a slight decline in fleet numbers, but increased capacity (power & tonnage).
- NI is characterised by a comparatively old fleet, which now numbers about 140 over 10m vessels (most trawling for Nephrops, landing whitefish as bycatch and with seasonal scallop dredging); around 200 inshore vessels fishing crab and lobster; and a modern pelagic fleet of three large vessels over 50m in length fishing for mackerel, herring and other small pelagic species.
- **Demersal (Nephrops/whitefish and scallop)** vessels dominate the NI fleet. These are reducing in number, but landed volumes have not declined significantly and the landed value has increased over the last ten years. All sizes of Nephrops trawlers have seen consistently positive, but fluctuating operating profit levels related to export prices.

- Some further fleet consolidation can be expected even though on average the economic performance of all NI sectors is consistently positive. Skippers retiring without succession plans may sell their vessel licenses outside the NI fleet.

- New vessels are getting larger and deeper to make them more efficient (in terms of fuel, fishing and catch handling), somewhat less weather dependent (able to operate in adverse weather) and more comfortable (important for attracting and retaining crew). In the next 20 years, the new vessels entering demersal fleets elsewhere (Scotland was traditionally the source of second-hand vessels for NI) may face too many operational constraints to be suitable for NI's fishing ports.

- The issues facing the demersal sector are inter-related: a lack of investment in port infrastructure; limited investment by fishing businesses; an inability to attract crew and new entrants; the sale of vessel licenses outside NI.

- Some further fleet consolidation can be expected even though on average the economic performance of all NI fleet sectors has been positive over the last ten years. The licenses of NI vessels with skippers reaching retirement age without clear succession plans, are being sold to Scottish fishing interests that are investing in larger vessels.

- Several old vessels have been abandoned in the fishing ports and the issues this causes to other harbour users will worsen unless 'End of Life' responsibilities are enforced and viable decommissioning facilities are available.

- The modern, three-vessel **pelagic** fleet is highly profitable, has seen multimillion-pound investment and has no problem attracting and retaining local crew. The new vessels are already too large for the NIFHA ports, but two acting as a pair team land most of their catch (all herring and most mackerel) into Belfast for sale to NI processors. The largest vessel catches larger volumes as well as other species that are not sought by NI processors. It is processing capacity, not just port capacity that results in most of its catch being landed into major European pelagic ports.

- **Inshore fleet** is a potting fleet that is differentiated between the Down fleet, making up most of the fleet and the North Coast fleet that is widely dispersed with a concentration of ten currently operating from Greencastle, Co. Donegal.

- After an increase between 2008-2013 numbers have decreased to just below 200 vessels, but the fleet has consolidated into a few ports, particularly Kilkeel and Ardglass where space for the inshore fleet is inadequate. New inshore vessel designs provide more deck space for efficient and safer operation, with many moving to wider boats such as catamarans, which require more port space.

- The inshore potting fleet uses environmentally friendly static gear and has relatively low operating costs. Management of the inshore target stocks is now receiving more attention, but effort management is urgently needed to address the recent effort increases that have resulted from high crab prices.

6.1.3 The ports

- The NI fleet has mostly consolidated into the 3 NIFHA fishing ports: Ardglass and Portavogie (both showing recent reduction of > 10m fleet and increases in the inshore fleet) and Kilkeel (stable over 10m fleet in recent years, but a reduction in inshore vessels).
- The fleet sector facing the most significant operational constraints due to port capacity in the NIFHA ports is the demersal fleet. The largest fleet is based in Kilkeel which faces the greatest operational constraints.
- **Ardglass** is home to two of NI's pelagic processors and has historically been the centre for pelagic landings. However, the harbour depth & length of quayside is constraining many new pelagic vessels from landing. Tankers deliver fish from the NI vessels landing in Belfast (an hour away) instead of tankers moving fish from quayside to factory. There is also poor provision for the expanded inshore fleet.
- **Kilkeel** has considerable access (water depth, weather and tidal) constraints as well as overcrowding at the quayside, but busy onshore sector.
- UK and Irish ports with comparable volumes and value of landings are not so constrained in terms of water depth & access.
- Kilkeel harbour is constraining investment and growth in the fishing and associated maritime sectors. While the number of vessels may reduce somewhat in the future, the port would still be limiting in terms of space, depth and access.
- Nevertheless, there is considerable economic activity from numerous seafood & service businesses around Kilkeel harbour.
- Increased value to the NI economy could be achieved if servicing companies had the space to expand and so receive vessels from the local fleet and beyond.
- **Portavogie** has some depth constraints and a narrow entrance, but overall there is adequate quayside space that is in reasonable repair and the fleet is reducing in number.
- Outside the NIFHA ports, the inshore fleet is sparsely distributed at various multi-use ports and landing points around Northern Ireland's coast. These assets are managed and maintained by the local authorities that often prioritise the tourism sector.
- NI ports outside the NIFHA network that have greater capacity in terms of water depth (Belfast, Bangor, Lisnahally and Warrenpoint), face several other issues that would make it unfeasible for the NI demersal fleet to relocate, including the distance from key fishing grounds (other than Warrenpoint), available quayside space and that the stated strategic intent of all the ports is in targeting other economic sectors.

6.1.4 Infrastructure needs

- Any one of the NIFHA ports could be developed to reduce the operational constraints of the demersal fleet, creating wider benefits for the port concerned and for the sector. However, the creation of new port capacity would not necessarily result in the wholesale relocation of fleets

as operators have many connections to their home ports, suggesting that specific targeted investments at the three NIFHA ports may best support NI seafood sector development.

- A new, extended port at Kilkeel would remove access constraints and to better integrate activities with other port users & the town as whole.
- A well-planned port development of sufficient size will enable Kilkeel to develop as the Irish Sea Marine hub, supporting seafood and marine industrial services.
- The scales of potential port development at Kilkeel need to be clearly defined and costed, i.e. what would be required to accommodate the demersal, inshore and all or part of the pelagic fleet.
- A 'do nothing' scenario is not a no cost option: without a larger port, the industries are stymied and will become less competitive than businesses in other ports that are not faced by those constraints.
- Additional landings by the largest pelagic vessel would add value, but this is only likely with increased processing capacity following the requisite expansion in port capacity.
- Additional economic activity from ancillary support services is likely with more capacity to receive vessels from the local fleet, elsewhere and potentially the pelagic vessels if of sufficient capacity.
- The inshore fleet in Ardglass is poorly served – pontoons would alleviate over-crowding (potentially in a dredged 'Sawpit' area).
- Portavogie has sufficient port space that could be maintained for the current and expected future fleet. It has a slipway that could, with investment to upgrade, support the development of ancillary activities and there is space available (e.g. Parkgate site) for larger developments. This potential will be explored further in Stage 2.
- Small scale infrastructure investment outside of the NIFHA ports is needed. The whole fishing industry must be able to access available funding and be included in FSDP support measures.
- More information is needed and will be sought in Stage 2 work under the FSDP to ensure port development proposals to support the demersal fleet are fit for purpose and realistically costed.

6.2 Recommendations

This Stage 1 report focuses on the NI fishing fleet. The Stage 2 report will explore the wider seafood sector in Northern Ireland and other port-based users. Both will contribute to the Fishing and Seafood Development Programme that will contain a comprehensive suite of recommended actions.

The recommendations below are made for earlier consideration to help inform the FSDP that will contain a comprehensive suite of recommended actions.

1. Commission an 'Outline Design & Costing' study for an extension to Kilkeel Harbour, which would develop fully costed options to determine how much additional cost would be required to accommodate the demersal fleet and all or part of the of the pelagic fleet. The study should

also take account of desire to improve safety, access, efficient vessel movements within the port and provision of adequate quayside & space for shore-side development.

2. Additional work to inform a decision to carry out detailed technical and environmental studies to develop Kilkeel.

   ⇒ Review of the outline business case for developing Kilkeel in the light of revised development options and costs

   ⇒ Review of the technical specifications for detailed technical and environmental studies at Kilkeel, to include the impact on sediment movement and possible mitigations.

3. Review the Ardglass feasibility study when available to inform an outline business case for developing Ardglass, prior to potential development of specifications for detailed technical and environmental studies.

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ICES (2019d) Herring Advice ICES Advice on fishing opportunities, catch, and effort Celtic Seas Ecoregion Herring (Clupea harengus) in Division 7.a North of 52°30'N (Irish Sea); Herring (Clupea harengus) in divisions 6.a and 7.b–c (West of Scotland, West of Ireland); Herring (Clupea harengus) in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k (Irish Sea, Celtic Sea, and southwest of Ireland) (Published 28th June 2019); Greater North Sea Ecoregion Herring (Clupea harengus) in Subarea 4 and divisions 3.a and 7.d, autumn spawners (North Sea, Skagerrak and Kattegat, eastern English Channel) (Published 29th May 2019)

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Appendix B: NIFHA Fishing Port Maps

Figure 26. Ardglass harbour area, source: NIFHA

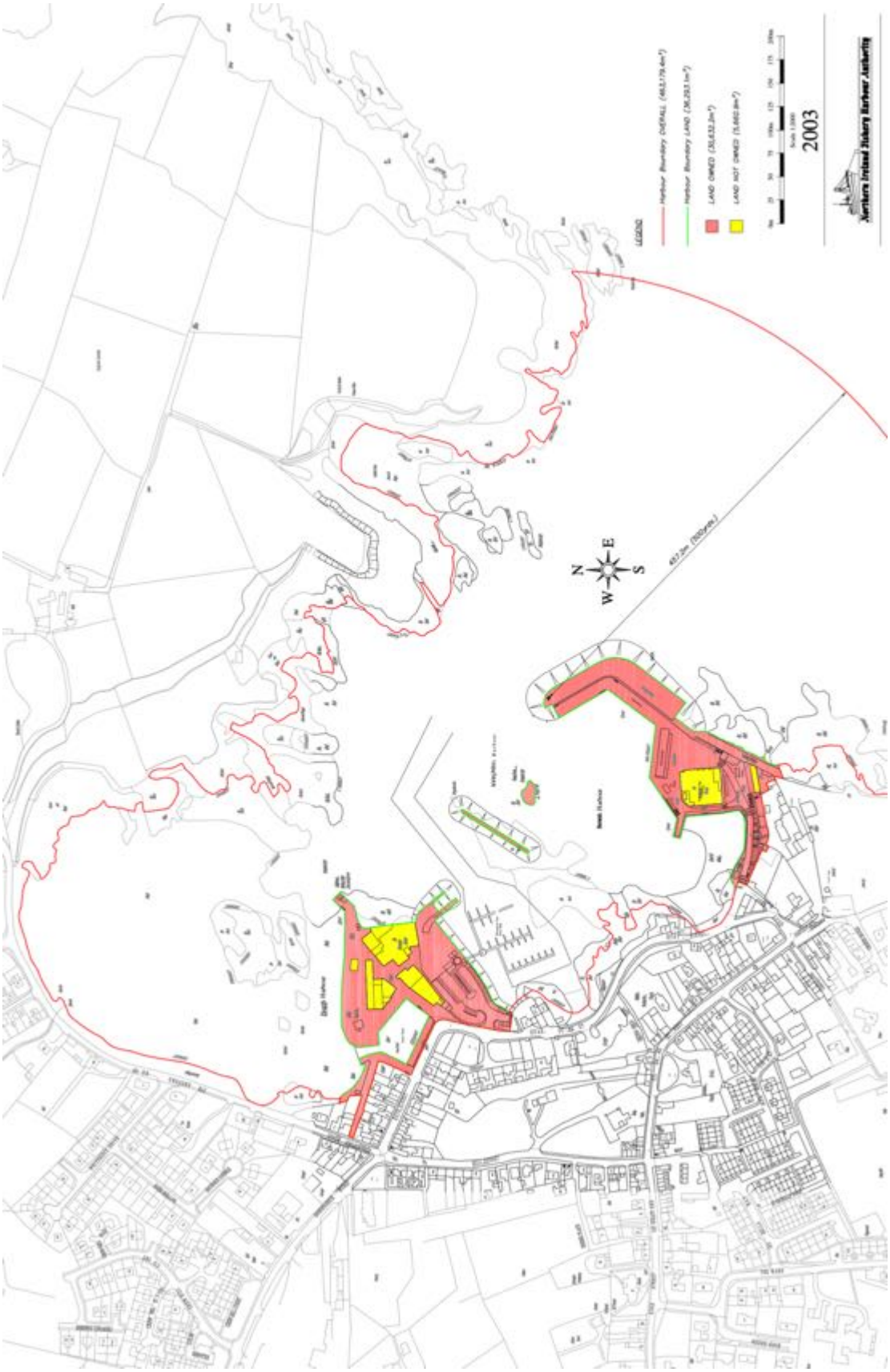
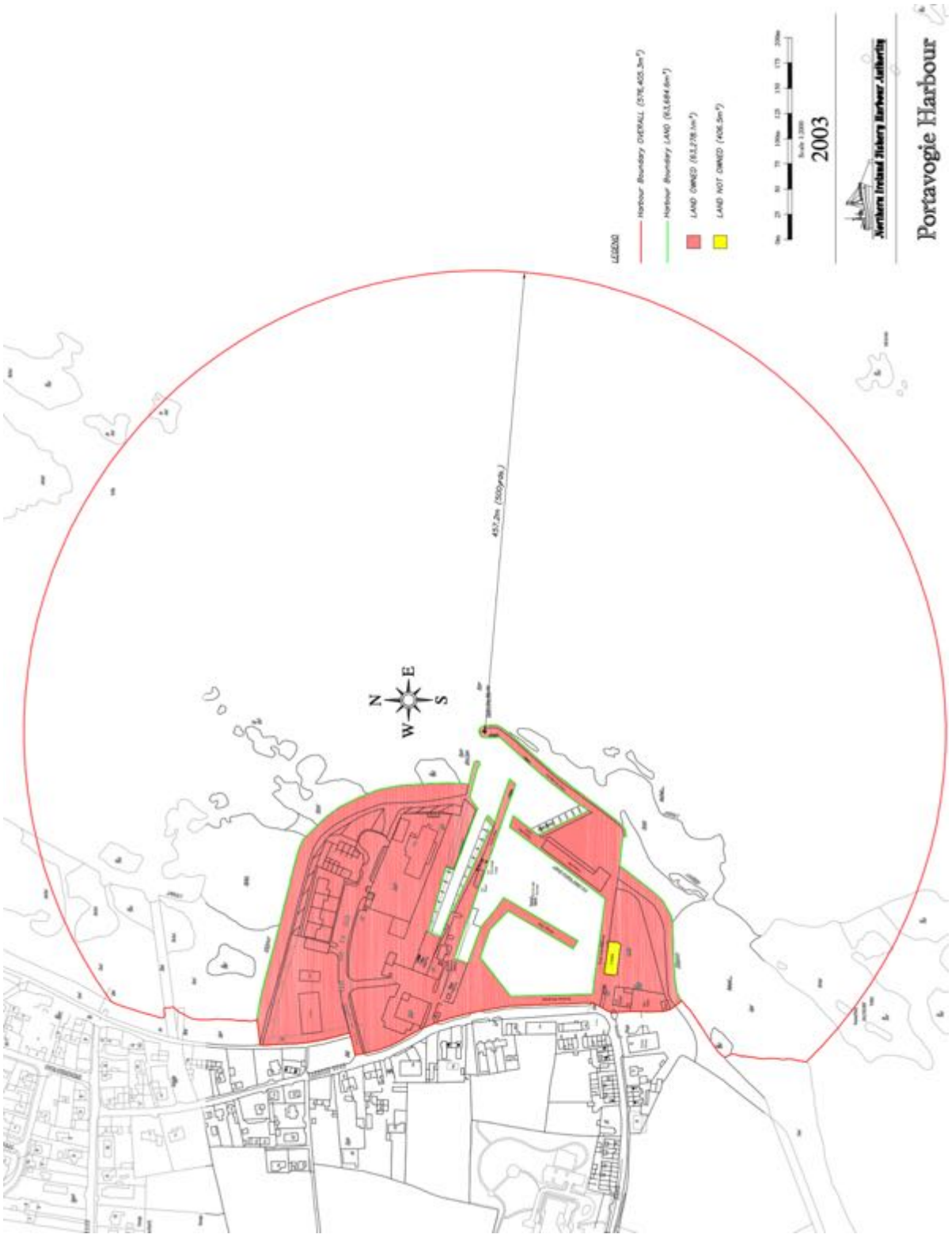


Figure 27 Kilkeel harbour area. source: NIFHA

Figure 28 Portavogie harbour area. source: NIFHA



Appendix C: NI Fleet Physical Characteristics

The following section explores some of the trends in the physical characteristics of the Northern Ireland fleet in comparison to the UK as a whole and the Scottish fleet (which has traditionally been the source of many second-hand vessels entering the NI fleet). The basis for the graphs below are:

- ⇒ Analysis based on the MMO over 10m vessel list (administrative port of Belfast assumed to be the NI fleet).
- ⇒ The data excludes the 3 pelagic vessels in the NI fleet as these skew the averages.
- ⇒ Vessels are grouped by hull build date (not date of entry into the NI fleet)
- ⇒ Note: only 5 vessels in NI fleet below 10 years of age so the averages derived are less indicative of trends in characteristics[14]

The key trends are highlighted below in bold with the graphs illustrating those trends.

1. **Northern Ireland's more recent additions to its fleet are relatively smaller and less powerful vessels than the newer Scottish and UK fleet as a whole, which was not the case 30 years ago.**

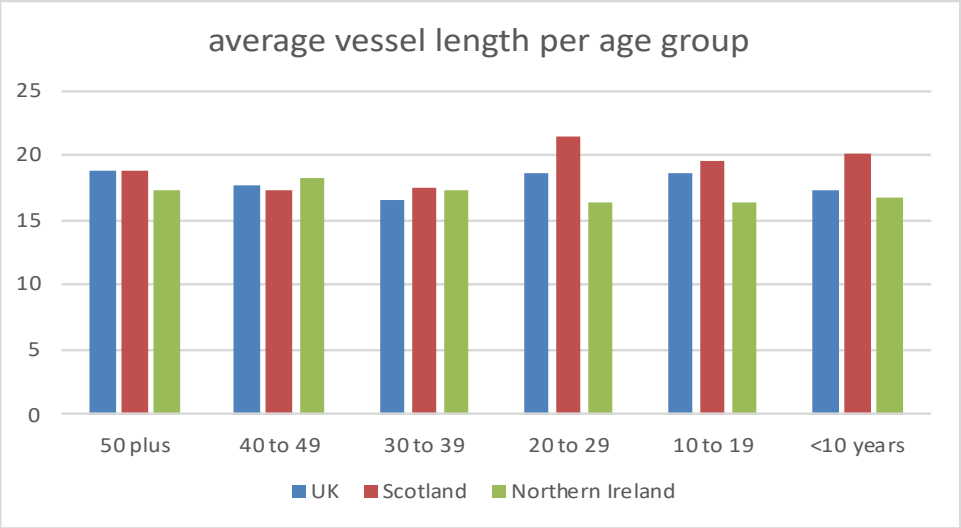


Figure 29 Average vessel length per age group, UK, Scotland, NI. source: MMO

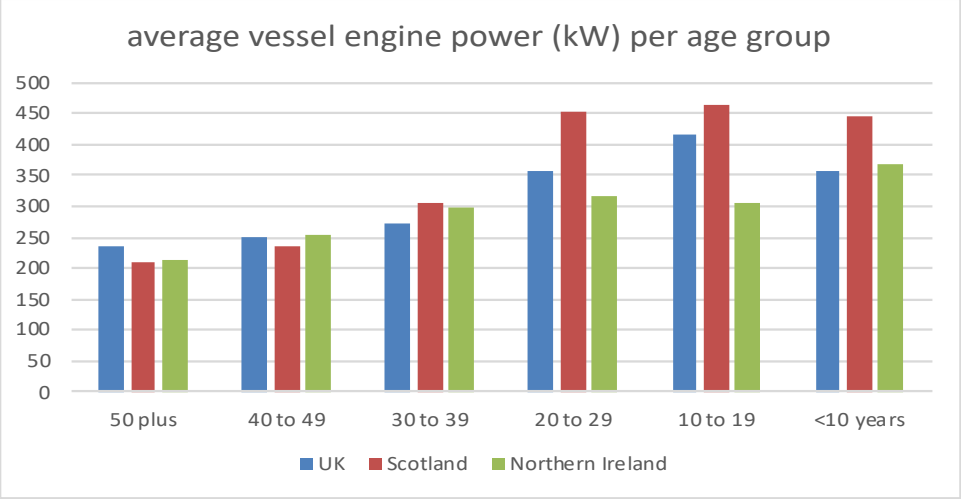


Figure 30 Average vessel power per age group, UK, Scotland, NI. source: MMO

[14] Including the uncharacteristically large & powerful Unity built in 2012, entering NI fleet in 2017.

2. **Average breadth (beam) has been increasing in all fleets, but again this increase is less for the NI Fleet than the Scottish fleet and the UK fleet overall.**

VCU = length x breadth + (0.45* power) so **breadth** = VCU-(0.45* power) / length

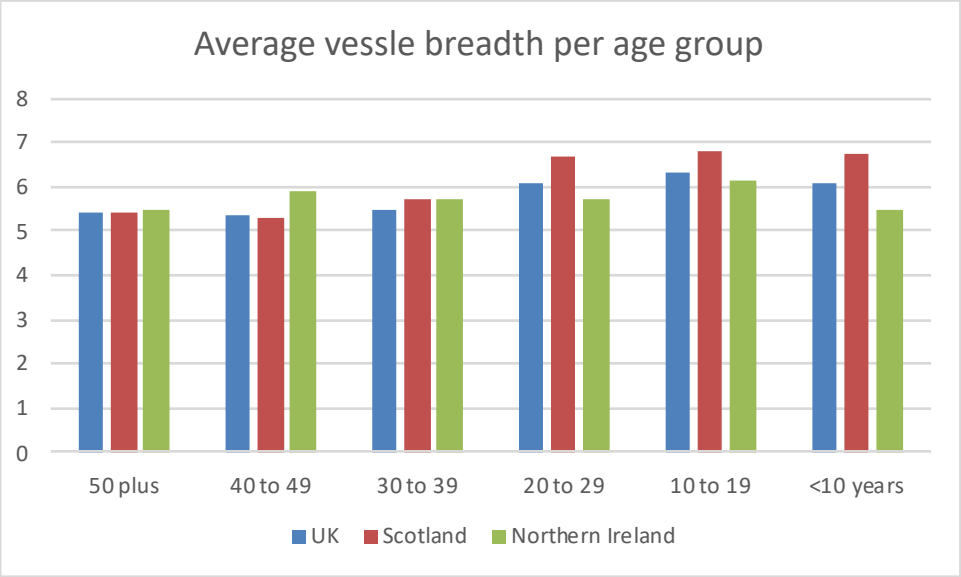


Figure 31 Average vessel breadth per age group, UK, Scotland, NI. source: MMO

Vessel depth

As the figure below illustrates, the vessel depth (also referred to as the moulded depth) is the distance between the bottom of the hull and the main deck. This differs to the draught (draft) of a vessel which is the difference between the bottom of the vessel and the water line.

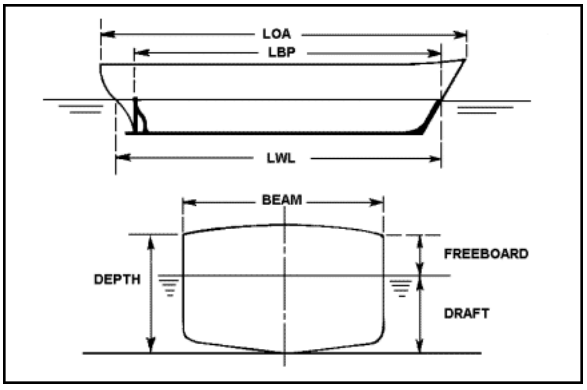


Figure 32 Diagram showing vessel depth and draft. source: globalsecurity.org

Draught is not reported in the MMO UK vessel lists as it can be affected by multiple factors such as the trim of the vessel (how it sits bow to stern) and environmental conditions. It has only been possible to estimate vessel depth and this should not be treated as an accurate indicator of vessel draught or the water depths required. It is, however, an indicator of the general shape of vessels and so an increasing depth is likely to mean an increase in draught. An additional factor with modern vessels is that the keel is attached to the hull running from the propeller, which can add half a metre to the draught (see App.D for further details).

3. **Average depth of vessels has been increasing for all fleets and this is particularly noticeable in the Scottish fleet.**

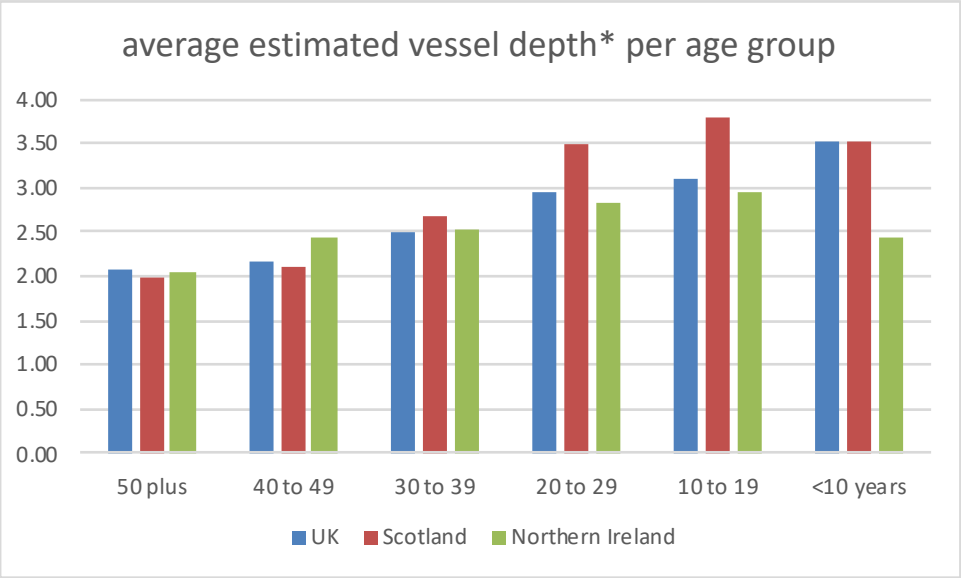


Figure 33 Average estimated vessel depth per age group, UK, Scotland, NI. source: MMO

*Vessel depth has been estimated by reworking the MMO's formula for calculating GT in relation to vessel length, breadth & depth.

The growth in depth to length ratio shows this is not just down to larger vessels overall, but designs that are relatively deeper (and as shown above, wider).While vessels entering the UK have been getting deeper on average, this is particularly evident in the Scottish fleet.

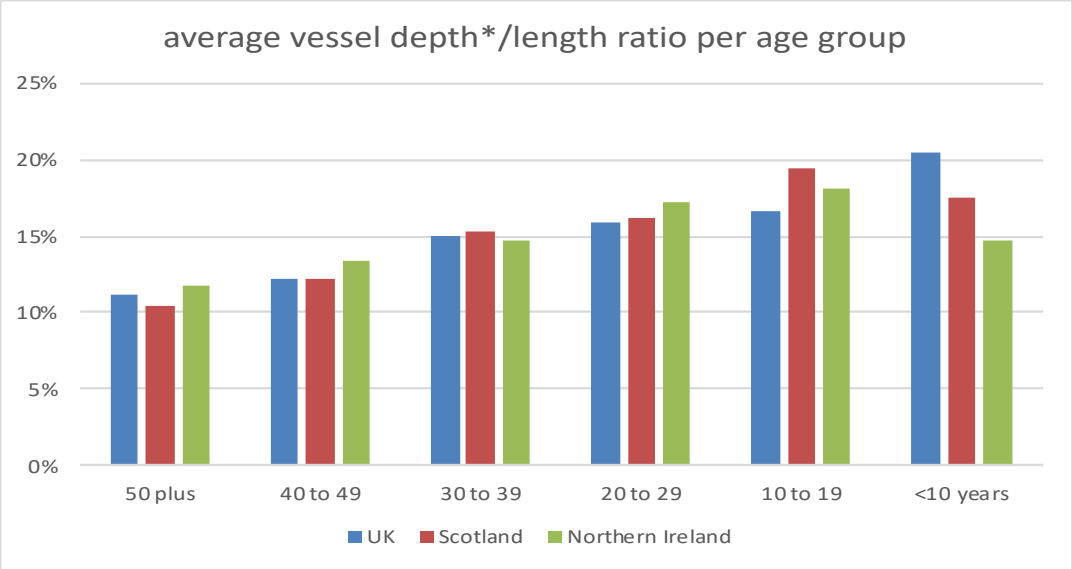


Figure 34 Average vessel depth/length ratio per age group, UK, Scotland, NI. source: MMO

Appendix D: Future Vessels

Vessel design

As shown in Appendix C, certain hull trends are evident in the Northern Ireland fishing fleet. The FSDP should also be cognisant of trends in modern vessel design to better understand the likely size and shape of a future Northern Ireland fleet. This section is informed by discussions with Macduff Ship Design & the developers of the MDV1, a Dutch prototype trawler.

Fishing and shipbuilding companies in the Netherlands collaborated on the project, Masterplan for Sustainable Fisheries (in Dutch Masterplan Duurzame Visserij – hence MDV), which centred around a twin-rig stern trawler, the predominant type of over 10m vessel in Northern Ireland's fleet. The project sought efficiency improvements in hull design, propulsion system, fishing method and even power consumption on board. A 60% emissions reduction is reported as a result of these design innovations.

The hull is a wedge shape in planform: a nearly vertical narrow bow, a full body amidships and a wide and relatively flat aft ship, which performed the best in various wave conditions. The vessel was completed in 2015 with a length of 30m, 8.6 m beam, depth to main deck of 5.87m and a 4.5m draught. For comparison, this equates to a depth/length ratio of 19.5%, similar to newer vessels in the Scottish fleet (see App.C).

As of February 2019, the shipbuilder had built a 6 more vessels with the same design and has orders for seven more[15]. This includes a number of smaller models at 19.2m for French customers designed for fly shoot and twin-rigging.

Figure 35 Photograph of the MDV1 Immanuel prototype stern trawler (left) source: vesselfinder.com and design profile for UK fishermen in 2019 (right). Source: undercurrentnews.com

The hull shape of MDV is optimized for sea conditions, but skippers have a range of factors they ask for when commissioning a vessel. UK fishing vessels have been getting wider and deeper mainly for reasons of stability. More space is needed for more gear and catch handling/storage, this leads to more weight being carried and a need for more beam for stability (Macduff pers. comm.)

There is a move to accommodate crew on the upper decks mainly for safety reasons – further away from the water line and so risk of flooding. Improved crew accommodation with more privacy per cabin is also an important aspect in attracting and retaining crew

[15] https://www.undercurrentnews.com/2019/02/05/futuristic-dutch-vessel-successful-in-cutting-carbon-emissions-by-60/

Recent designs have also seen relatively smaller engines (App. C shows a recent dip in av. Engine power for newer in the Scottish fleet) twinned with larger propellers to give better performance at lower towing speeds. This gives better fuel efficiency and the added benefit of giving more Gross Tonnage for the same VCUs.

A further innovation is weight reduction with the aim of reducing fuel costs without reducing structural strength. Although the structure is made of steel, the doors and other elements are made of a composite material, with the potential for a composite deckhouse to further reduce weight.

Vessels have also been getting deeper. The Lery Charles by Macduff below has an overall length of 19.8m with a beam of 7.9m, depth of 4.11m and a depth to length ratio of 20.8% (Figure 36). Even where the 'moulded depth' (from the bottom of the hull to the main deck) is not increased, vessels are sitting deeper in the water as the keel is often built onto the bottom extending from under the propeller and adding another half a metre to the draught compared to amidships (particularly with trend for larger propellers described above).

Figure 36 Modern fishing vessel showing deeper draught and keel. Source: Macduff Ship Design

The move to wider, deeper vessels is a compromise against the loss in fuel efficiency /speed compared to relatively longer designs (Macduff, pers. comm.).

The extent to which length can be increased is limited by the implications this has for overall VCUs and also by regulations which determine that vessels over 24m require an engineer and the skipper requires more qualifications. There are other operational regulations that start to apply with vessels over 24m as set out in the 'Code of Practice for the Construction and Safe Operation of Fishing Vessels of 24m Registered Length and Over' (MCA, 2019). This is evident in the NI fleet where only 5 vessels have an LOA over 24m and the registered length of all but one (a Greencastle mussel dredger) has a registered length of below 24m[16].

[16] Unity, the largest in the demersal fleet, has a registered length of 23.99m. Built in 2012 and joining the NI fleet in 2017, it has been fishing whitefish and Nephrops throughout the Irish Sea, Celtic Sea and West of Scotland landing into Kilkeel, Bangor and further afield (Newlyn & Mallaig).

Propulsion systems & fuel

Efficiency improvements through engine modernisation will continue to be driven by the dual benefits of reduced operational costs and reduced environmental impact (an external cost).

Fishing is a very conservative sector and is not likely to lead on new technology in fuel and propulsion systems. The focus of IMO emission reduction targets is on larger ships that account for the bulk of emissions, but some trickle-down of technologies and the use of cleaner fuels can be expected over the next decade.

But what about more radical changes, such as moves away from diesel engines, as is occurring in the car trade? While theoretically possible, there are a number practical constraints to adopting these new fuel systems in fishing vessels. The high engine loading used for fishing activities and the trip lengths that can be several days makes electric engines more challenging (compared to most ferries, which have shorter journey times with time in dock in between).

There are also practical issues of ship space required for fuel storage: diesel is useful as a diesel tank can fit anywhere, moulded around other parts of the ship, while LNG and hydrogen currently require very strong cylinders to withstand pressures for practical storage in a liquid state.

The MDV's propulsion system has a combined diesel-electric power supply uses two generators: a large, 500kW generator for when the boat is lightest during transit and fishing, and a smaller 117kW generator used for bringing the boat slowly back to shore with a heavy load of fish. It also has a large, three meter-wide, slow-moving propeller rather than a smaller one with higher rpm, which is less efficient at generating forward thrust.

Hybrid propulsion is already developed (diesel switching to electric when possible) and uptake in the fishing sector could be incentivised by government. The Dutch government has stated it wants carbon-free vessels by 2050 as part of its commitment to the Paris Climate Agreement. The MDV designers have developed blueprints for vessels operating on alternative fuels such as LNG or electric engines. This is part of a Circular Economy Design Index (CEDI) being used to design future vessels that deliver zero emissions, zero waste and zero accidents.

The UK government has set a 'Net Zero' carbon target by 2050, but it is not clear how and the extent to which each sector is expected to achieve this. However, the move towards reduced emissions is very evident. The current drive to reduced emissions in relatively smaller marine vessels such as fishing boats is for cleaner fuels through low sulphur diesels and scrubbing systems on the exhaust to remove Sox, NOx and particulates from the exhaust fumes.

In the longer term, developments are partly dependent on battery development and some predict the use of synthetic fuels. Which particular fuel is most widely adopted in the long term will depend on how the technology develops associated with the production and storage of synthetic fuels such as hydrogen or methanol. Although battery technology is economically/technically evolving, it still requires significant further evolution in terms of performance, cost reduction and intrinsic safety before it could be preferable to synthetic fuel options [for fishing vessels], unlike ferries travelling short distances (Veenstra et al, 2019).

Appendix E: NI Pelagic Fleet Activity

Table 8 Landings of herring and mackerel by the NI pelagic vessels in tonnes (top) and % (bottom) 2006-2018*

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Norway	10,932	6,115	-	-	1,632	4,941	8,519	4,856	15,469	4,460	-	1,003	2,827
Northern Ireland	6,238	6,674	7,524	8,050	8,170	7,194	7,159	6,503	6,398	5,021	7,106	6,334	7,615
Scotland	3,015	8,558	4,566	604	9,270	7,586	2,026	1,019	1,585	3,235	3,143	2,207	3,182
Republic of Ireland	-	1,520	0	1	-	1,354	7,504	12,027	2,419	8,027	-	6,204	11,555
Denmark	382	-	-	-	-	3,684	2,640	1,796	10,036	6,722	-	10,579	5,792
total	20,568	22,867	12,091	8,655	19,072	24,760	27,848	26,201	35,906	27,466	10,249	26,327	30,971
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Norway	53%	27%	0%	0%	9%	20%	31%	19%	43%	16%	0%	4%	9%
Northern Ireland	30%	29%	62%	93%	43%	29%	26%	25%	18%	18%	69%	24%	25%
Scotland	15%	37%	38%	7%	49%	31%	7%	4%	4%	12%	31%	8%	10%
Republic of Ireland	0%	7%	0%	0%	0%	5%	27%	46%	7%	29%	0%	24%	37%
Denmark	2%	0%	0%	0%	0%	15%	9%	7%	28%	24%	0%	40%	19%
total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

*2016 is anomalous due to fleet replacement activities

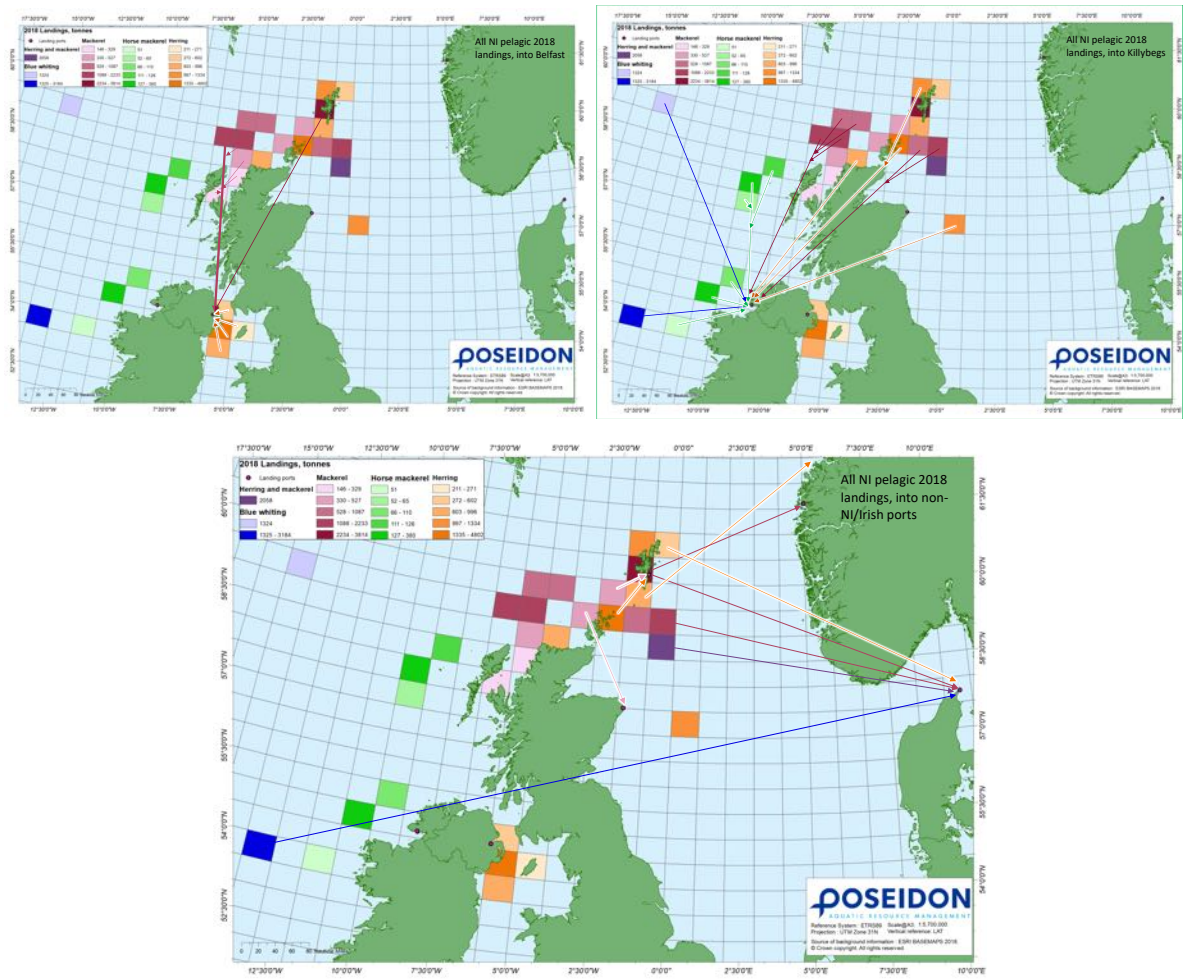
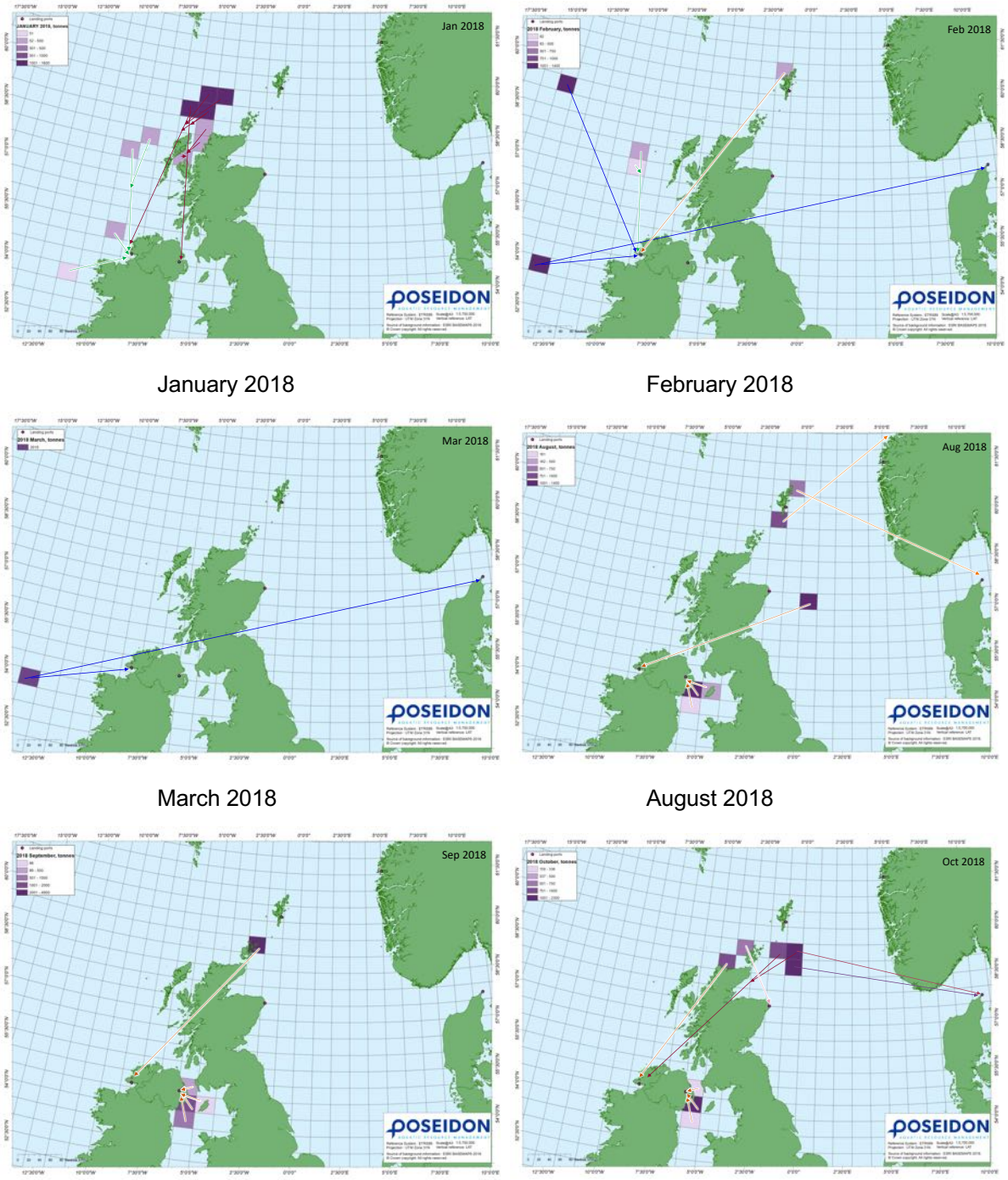


Figure 37 NI pelagic catches & landings into Belfast (left), Killybegs (right) and others (bottom) in 2018 (source: DAERA, 2019b)



January 2018 February 2018

March 2018 August 2018

September 2018 October 2018

Figure 38 Seasonality of pelagic catches by NI fleet. source: DAERA

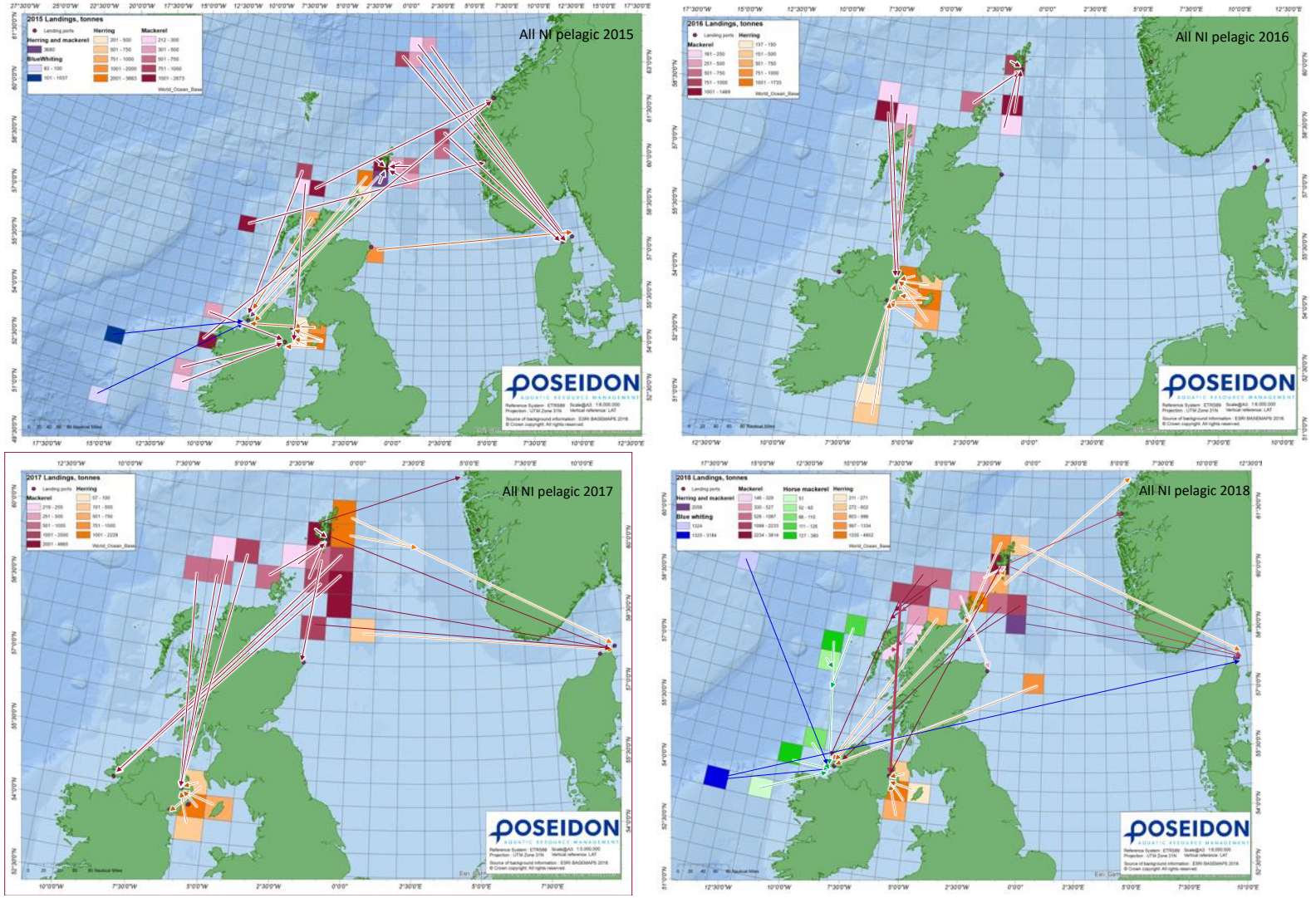


Figure 39 Pelagic catches by NI fleet 2015 to 2018*. source: DAERA

*Note 2016 is anomalous due to vessel changes.

Appendix F: UK & Ireland Fishing Port Comparisons

Figure 40 below presents the top 20 ports by volume and value of UK vessel landings. This list shows a distinction between a small number of what might be termed 'Tier 1' fishing ports could be defined as ports with landings of more than 12,000t and/or around £30 million. These ports include Peterhead, Lerwick, Fraserburgh, Scrabster, Brixham and Newlyn.

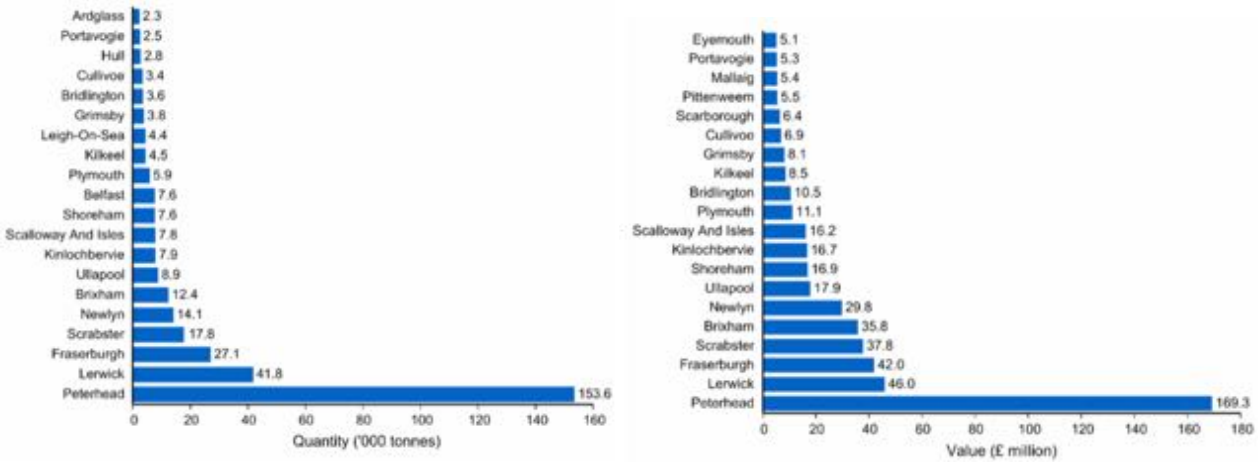


Figure 40 Fish landings to top UK fishing ports, 2018. source: MMO

Ardglass, Portavogie and Kilkeel all feature in this list as what could be described as 'tier 2' fishing ports. Between 2006-18 these three averaged*:

Ardglass	8,528t	£7.5m
Kilkeel	5,097t	£8.3m
Portavogie	3,076t	£5.8m

*including foreign vessel landings (such as the ROI vessels landing herring in Ardglass)

UK ports with similar landed quantity and value to compare the NI fishing ports with are Ullapool, Kinlochbervie, Scalloway, Shoreham, Plymouth and Bridlington.

For Ireland, a similar approach identifies Castletownbere and Killybegs as 'tier 1' Irish fishing ports, while Dingle, Dunmore East Rossaveal, Howth, Kilmore Quay and Greencastle could be considered as 'tier 2'.

Table 9 Total landings into top Irish ports, 2017

Port Name	Sum of Tonnes	Sum of New Value
Castletownbere	36,446	€ 112,297,775
Killybegs	220,047	€ 100,208,700
Dingle	8,895	€ 18,875,294
Dunmore East	7,942	€ 17,171,586
ROS A MHIL	2,744	€ 11,472,023

HOWTH	4,331	€	11,435,371
Kilmore Quay	4,286	€	10,482,883
Greencastle	3,846	€	9,607,944

Source: SFPA, 2019

Total landings into Northern Ireland have fluctuated at around 22,000t. While there should be an aspiration for growth and total NI fleet landings were more than double this, it is not realistic to expect all of this to be landed into NI. A major contribution to the NI catch volume is pelagic species that are being targeted in the North Sea or West of Ireland by the 3 large pelagic vessels. It could be expected that these landings will continue to be landed into tier 1 UK & Irish ports, particularly Lerwick, and Killybegs or further afield in Norway and Denmark.

The table overleaf provides a comparison of the tier 2 ports in UK and Ireland in relation to a number of key features. This illustrates that all three NI ports are more constrained in terms of tide and water depth in significant areas of the port compared to other UK and Irish ports with a similar volume or value of landings. Two exceptions are Sutton Harbour (Plymouth), which operates lock gates to enable access beyond the 3 hours either side of high tide, and Bridlington (dubbed the 'lobster capital of Europe'), which supports a significant potting fleet. A passive gear fleet is better able to operate around the tidal restrictions than a trawl fleet as 'fishing time' is not lost with passive gear in the water continuing to fish.

Table 10 Comparison of UK and Irish fishing ports with similar scale of landings

Port (ownership)	Fleet	Tidal	Water depth*	Quayside space	Comment & Developments
Kilkeel		Y	Maintained 1.5m LAT Weather safety system "Best approached on half tide" Moving sandbar outside harbour entrance.	Est. 750m+, but shallow at NW head of the inner harbour.	Last port expansion in 1955 with pontoons for small boats and a new slipway completed in 2008 (KSP, 2016).
Ardglass		Y	Maintained at 3m Not to approach at night or low tide/ overtopping from onshore	Est 200m	Pier extended late 20th Century. New fish market and ice plant around 2010. 80 berth marina for leisure craft (NIFHA, 2019).
Portavogie		N	Maintained at 3m in harbour, nearer 2m at entrance Narrow, slightly shallower entrance along the shoreline: do not approach in any significant onshore winds.	Est. 650m+	New harbour was constructed in 1955, further developed in 1975 and 1985, doubling the size, deepening the basin, providing a market area and ice making machinery (NIFHA, 2019).
Ullapool (trust port)		N	Shetlered within Loch Broom. 'can cater for 7m draught, 140m length'	One large open pier	Pier extended to cater for Scottish and Spanish whitefish & shellfish vessels. 100m slipway and 'wee pier' renovation in 2018.
Kinlochbervie (council)		N	Draft alongside piers: MHWS 9.5 m MLWS 3.9 m MHWN 8.0 m	500m with 100m finger pier dredged to 4m	2009 pontoon development extended in 2013.

			MLWN 5.5 m		
Scalloway (council)		N	Commercial quay 6.5m Fish market 4.8m Jetty 4.6m	865m of quayside	Services shipping (oil sector) and fishing.
Shoreham (trust port)		N	5.5m minimum	Extensive quayside for large cargo vessels.	Cargo, fishing and leisure. Most fishing vessels land at end of Eastern Arm and tie up along deep commercial wharfs. Smaller vessels at marina.
Plymouth – Sutt harbour (private)		N/Y (3 hrs free flow then lock gates)	5.5m draught max.	110m of landing quay Pontoon berthing.	Major port with most fish landings at private harbour (tidal lock, electronic auction), except large pelagic vessels landing at commercial port quays.
Bridlington (trust port)		Y	Tidal constraint	South pier for landing & marina berthing	Major shellfish port with crane wharf. Proposal for a new £115m outer harbour for leisure craft, with fishing fleet remaining in current harbour, shelved in 2018[17].
Dingle (DAFM FHC)		N	V sheltered within a natural harbour. Min depth 3m, 5m depth at unloading quay	500m of berthing capacity at main pier dredged to 5m	5m large vessel berths in western basin & 2m berthing marina for smaller vessels

[17] https://www.eastriding.gov.uk/say/features/yorkshire-harbour-and-marina-project/

Howth (DAFM FHC)		N	Artificial harbour with 3.7m approx depth at entrance and at berths 2 m minimum No constraint, sheltered	630m 2 large piers (19th century)	Mix of fishing and recreation boating Big tourism draw with many seafood establishments
Dunmore East (DAFM FHC)		N	Min depth 2m. Dredged to 3.6m	450m plus 60m unloading pier	Vessels 30m+ restricted movement in the harbour area.
Rossaveal (DAFM FHC)		N	Min depth 3.7m 5.8 metres C.D. pocket at west side of No. 2 pier.	340m plus 90m reserved for cargo vessels	Complete shelter within Cashla Bay with outer anchorage for larger vessels in 9m water depth.
Greencastle (council)		N	Min depth 3m at entrance and quaysides Sheltered within North Channel to Lough Foyle	500m including the pontoon.	New 100-metre long pontoon and breakwater have been installed at Greencastle. Fishing vessels berth several abreast in inner harbour instead of more exposed outer.

*Source: eOceanic.com (e.g. Kilkeel info on access & approach: https://eoceanic.com/sailing/harbours/113/kilkeel_harbour)

Appendix G: NI Port Development Comparative Analysis

Port capacity needs

The main report highlights the recent trends and current port constraints for the main Northern Ireland fishing fleet segments:

- **Demersal fleet**: new, more efficient vessels are wider and have a deeper draught. This will further constrain operations from NIFHA ports, particularly at the main fishing port of Kilkeel (home to the largest demersal fleet of over 50 vessels) where the fleet already faces significant limitations due to tidal constraints and access in poor weather. There is a risk that in the medium to long term, the NI demersal fleet, which makes up the majority of NI fishing capacity, will become less competitive as it is limited in its ability to invest in modern, efficient vessels.

- **Pelagic fleet**: No NIFHA port can safely accommodate the three, very large modern vessels making up the NI pelagic fleet. Two work as a pair team, berthing in Belfast and supplying NI processors from the brief Irish Sea herring fishery. The third and largest of the vessels does not generally land fish to NI ports. The pelagic fleet has outgrown the NIFHA ports, but it is not operationally constrained by this situation even though operating from County Down fishing ports would be more convenient than current arrangements.

- **Inshore fleet**: Water depth is less of a constraint to small inshore vessels, but growing numbers at the NIFHA ports and a trend towards wider vessels means that there is overcrowding in these ports with insufficient space and facilities. Elsewhere inshore vessels are somewhat dispersed and fishing facilities can be limited, particularly in harbours where the tourism sector is favoured.

A key objective of sector development should be to address the port capacity constraints affecting the demersal fleet. Addressing these should also result in benefits to the inshore fleet operating from the NIFHA ports. Such port development may also create the possibility for all or part of the pelagic fleet to be accommodated, which could have some benefits to pelagic processors and vessel service companies.

Below we present a comparative analysis of the NIFHA ports (Ardglass, Kilkeel & Portavogie) to identify which offers the most beneficial development opportunity. However, given the expected high cost of any such development, we first explore whether there is the potential to use existing alternative ports in Northern Ireland (termed the non-NIFHA ports) of Bangor, Belfast, Lisnahally and Warrenpoint.

Non-NIFHA ports

As port capacity in the NIFHA ports is constraining sector development, we explore below the potential to use other existing port capacity. This section considers the potential for utilising alternative existing port capacity in Northern Ireland outside of the three NIFHA ports. Below we assess four Northern Ireland ports: Belfast, Warrenpoint, Lisnahally (Foyle Port) and Bangor. All have had some occasional fishing vessel visits, but are not currently home to any of the over 10m demersal fleet.

	Belfast	**Warrenpoint**	**Lisnahally**	**Bangor**
Description	Largest port in NI with 8m+ depth at many quays and 2,000 acre port estate. Big plans for multi-use regeneration (residential, office and studio space). The pelagic pair team berth here, but with no landside provision.	Closest to Kilkeel, within Carlingford Lough where some mussel dredgers operate. 53 acre plot & recent £22m development with 300m of 7.5m quayside but already allocated to cargo (timber, with plans for CO_2 gas hub) and Ro-Ro.	Bulk port for cargo, oil & coal vessels and one fish quay with good water depth (7+m), enabling the pelagic vessels to land on occasion. 100 acre site with some space available (30 acres) and poss. more long-term.	Mainly a marina with 500 berths for leisure craft. Some inshore vessels use the harbour with limited facilities (water, electricity). 4m water depth means has been used by pelagic vessels on occasion.
Pros	Good water depth Quayside space Large harbour estate Good road/sea/air links	Reasonable water depth Good road links Proximity to: • Regular fishing grounds • Buyers/processors (Kilkeel) • Fleet services (Kilkeel)	Good water depth Space available for development	Reasonable water depth Good road links
Cons	Further than the NIFHA ports from: • regular fishing grounds	Lack of landside space Limited available quay space	Long distance from regular fishing grounds	Further than the NIFHA ports from: • regular fishing grounds

	• buyers/processors • fleet services Ambitious long-term development plans do not include fishing(1)	Development plans do not include fishing (2) Within sea loch with env designations may prevent extensive development & some land uses (e.g. fish processing).	Limited available quay space Long distance from key markets Within sea loch with env designations may prevent extensive development & some land uses (e.g. fish processing).	• buyers/processors • fleet services Ambitious long-term development plans do not include fishing (3)
Summary	Distance from fishing grounds & services means existing fleet would not move. Extensive re-organisation of land use to fishing would be an opportunity cost and is not in BHC plans.	Closest to Kilkeel (and reasonable distance to fishing grounds) with good water depth, but recent expansion of quayside space used by other sectors and no plan for fisheries sector.	Distance from fishing grounds & services means existing fleet would not move. Potential for development (3), but comparatively poor logistics & big distance from buyers.	Operated by a private marina company (4) with focus on leisure sector and no interest in developing or accommodating fishing sector.

(1) See 'Belfast Harbour Port Master Plan. 20-30 year period (BHC, 2016) & 'A Port for Everyone: A vision to 2035' (BHC, 2019)
(2) See 'Warrenpoint Masterplan Progress' https://warrenpointport.com/port/masterplan-progress/
(3) See https://www.londonderryport.com/about-us
(4) See http://www.quaymarinas.com/our-marinas/bangor-marina/overview/

The above review illustrates that, while a number of alternative ports in Northern Ireland with adequate water depth to address that particular operational constraint, several other issues make these ports less attractive options than the NIFHA ports. Critically, most are too far from regular fishing grounds in the Irish Sea to be viable alternatives for the demersal fleet: greater fuel costs and more steaming time would be more lost fishing time than through the tidal constrained NIFHA ports.

Warrenpoint is the exception, being comparatively close to the regular *Nephrops* and scallop fishing grounds as well as to the existing buyers and fleet services in Kilkeel. However, the latest development expanded quayside space for increased cargo handling and upgraded Ro-Ro facilities. There is no space available for the demersal fleet, which would require another significant quayside and landside expansion at the port. This is not

in the long-term plans of the Harbour Authority. Even if there were such ambitions, a development with a significant footprint may be unacceptable in relation to the Carlingford Lough SPA (for bird species) and Carlingford Shore SAC.

It is important to note that a wholesale relocation of demersal fleets from their current home ports to other ports with better capacity is highly unlikely (otherwise this would have already occurred to some extent). The individual vessel owners making up the demersal fleet have strong links to home ports in terms of crew, buyers, support services and the wider community.

These non-NIFHA ports do, however, offer landing and berthing options for the pelagic fleet. This is evidenced by the pelagic pair team berthing in Belfast (despite no quayside services within the harbour). During the few weeks fishing the Irish Sea herring, landings are transported by tanker to Co. Down processors (approx. one hour by road).

NIFHA Ports

Below we present a comparative analysis of development options specifically in relation to the demersal fleet at the NIFHA ports as well as the status quo of maintaining current facilities. The scale of impact is estimated in relative and qualitative terms against a range of criteria, but additional information is needed to be conclusive. Some of this information will emerge from the Stage 2 work with some short-term commissions on outline design and costings. This would then be used to inform a Strategic Outline Case (SOC) of a preferred option, which is required in advance of developing an outline business case for any one option.

Options	Status quo	Ardglass	Kilkeel	Portavogie
Development for demersal fleet needs	No development	Significantly extended quayside and berthing capacity at existing harbour for some displaced vessels.	New outer harbour needed to accommodate current and future Kilkeel fleet. Some displacement from other ports expected.	Widening and deepening of harbour mouth. Existing capacity for increase in demersal fleet, but not all vessels likely to relocate.
Financial cost	**Low** – ongoing maintenance	**Unknown** – await feasibility study on options (mainly related to pelagic landings)	**Unknown** Current plan est. £34m, but design focused on space for pelagic vessel(s)	**Unknown –** could be expected to be low with limited marine works

	Options	Status quo	Ardglass	Kilkeel	Portavogie
Environmental	**Physical Footprint**	n/a	**Significant** – substantially increased harbour space would be required.	**Significant** - a new outer and some coastal infill would be required.	**Negligible** if sufficient to just widen & deepen harbour mouth
	Carbon footprint	Some trucking of landings from Ardglass and Portavogie to buyers & processors in Kilkeel.	**Medium** – midway from grounds and 30 miles from most buyers in Kilkeel	**Lowest** – closest to southern grounds and most buyers & processors based in Kilkeel.	**Highest** – biggest steaming distance to southern grounds and 60 miles (45 with ferry) from buyers & processors in Kilkeel.
	Coastal processes	Need for continued dredging of NIFHA ports to maintain water depth.	**Medium** – development would be within a natural bay	**highest** – likely to impact longshore drift & coastal erosion, with need to mitigate.	**Lowest** – minor change to coastal profile.
Social	**Employment**	Likely to reduce in the long-term as operational constraints limit sector development	**Positive** – may expect limited shift from other ports but some fleet loss may be expected, countered by new onshore development.	**Highest positive** – potential to maintain fleet employment and to further develop onshore opportunities.	**Uncertain** – would not see many relocate to P'vogie from other ports so long-term fleet loss expected, but new onshore development more likely.
	Workforce	Some would need to re-locate as work opportunities reduce	**Moderate positive** – potential for increased local opportunities, but commute for workforce currently based in Kilkeel.	**Highest positive** Existing workforce can remain & have increased opportunities in Kilkeel	**Minor positive** - potential for increased local opportunities, but bigger commute for workforce currently based in Kilkeel.
	Community	Disillusionment across the communities at lack of investment.	**Moderate** support for limited development, but not at expense of tourism.	**High** demand for port development	Positive view on any port development, but low expectations.

	Options	Status quo	Ardglass	Kilkeel	Portavogie
Economic	**Demersal fleet**	Fleet investment impacted by port constraints, long-term reduced competitiveness.	**Strongly positive** – if of a sufficient scale to accommodate an expanded demersal fleet.	**Strongly positive** – would accommodate the current and future vessels, may attract operators from other NIFHA ports.	**Moderately positive** – could promote a reversal of the decline, but unlikely to attract as many other operators from other NIFHA ports.
	Pelagic fleet	Some inconvenience, but not impacting fleet investment. Processors missing out on some landings, and their scale may struggle to remain competitive in the long term.	**Moderately Positive** – reduced transport costs (v Belfast) and ensures future RoI landings. **Highly positive** if development of a scale for all pelagic vessels to be accommodated and greatly increased processing capacity encouraged.	**Moderately Positive** – reduced transport costs (v Belfast). **Highly positive** if development of a scale for all pelagic vessels accommodated and greatly increased processing capacity encouraged.	**Moderately Positive** – reduced transport costs (v Belfast).
	Inshore fleet	Limited space and facilities in some ports, but location close to home and grounds is key.	**Moderately Positive** – increased inshore fleet can operate more efficiently	**Moderately Positive** – inshore fleet could expand with more space.	**Minor Positive** – increased demersal activity could bring benefit to inshore with more buyer options and services.

Options		Status quo	Ardglass	Kilkeel	Portavogie
	other port-based sectors	Limited long term investment by associated sectors without port investment to enable increased capacity.	**Positive** for pelagic processors as would ensure landings continue. If landings to Ardglass at expense of Kilkeel: **Negative** for demersal buyers/processors, increasing transport costs **Neutral** for service sector – increased opps at Ardglass, but also increased costs for Kilkeel-based service companies.	**Positive** for demersal buyers/processors as would ensure landings continue. **Neutral** for Ardglass processors if pelagic landings increase over Belfast. **Positive** if all can be accommodated & new capacity developed. **Positive** for service sector as opportunity for the many current service companies to grow.	**Negative** for demersal buyers/processors as would increase transport costs. **Neutral** for Ardglass processors if pelagic landings increase over Belfast. **Neutral** for service sector with increased opps at P'vogie, but also increased costs for existing Kilkeel-based service companies.
Summary		Maintenance of existing port capacity will result in reduced sector activity over the long term as desired investment in the demersal fleet is constrained.	Medium environmental impacts from development & medium carbon footprint from operations. Positive social benefits for port-based workforce, but local community may not be accepting of large-scale development. Economic benefits are mostly positive, but mixed for non-fleet sectors currently based in Kilkeel. Current plans are thought to focus on accommodating the pelagic	Significant environmental impacts from development, but lowest carbon footprint from ongoing operations. Strong positive social benefits for port-based workforce and wider community. Highly positive economic benefits across most sectors (pelagic only if scale is sufficient for all to be accommodated)	Modest environmental impacts from development, but limited carbon footprint benefit. Social benefits for local community, but mixed for existing workforce required to commute. Economic benefits mostly positive, but mixed for non-fleet sectors currently based elsewhere.

Options	Status quo	Ardglass	Kilkeel	Portavogie
		fleet, not more of the demersal fleet.		
Info needs	FSDP Stage 2 work on NI seafood sector and other port industries.	FSDP Stage 2 plus… Await feasibility study to identify development options, but more work likely to be needed if accommodating a larger demersal fleet.	FSDP Stage 2 plus… Outline design and costings required to ensure fit for purpose in relation to demersal fleet.	FSDP Stage 2 plus… Cost of harbour mouth widening and deepening, but not proposed as not favoured option for accommodating demersal fleet.

Summary

- The fleet sector facing the most significant operational constraints due to port capacity in the NIFHA ports is the demersal fleet. The largest fleet is based in Kilkeel which faces the greatest operational constraints.
- NI ports outside the NIFHA network that have greater capacity in terms of water depth, face several other issues that would make it unfeasible for the NI demersal fleet to relocate, including the distance from key fishing grounds (other than Warrenpoint), available quayside space and that the stated strategic intent of all the ports is in targeting other economic sectors.
- Any one of the NIFHA ports could be developed to reduce the operational constraints of the demersal fleet, creating wider benefits for the port concerned and for the sector. However, the creation of new port capacity would not necessarily result in the wholesale relocation of fleets as operators have many connections to their home ports, suggesting that specific targeted investments at the three NIFHA ports may best support NI seafood sector development.
- More information is needed and will be sought in Stage 2 work under the FSDP, as well as specifically for Ardglass (awaiting feasibility study) and Kilkeel (outline design and costing proposed) to ensure port development proposals to support the demersal fleet are fit for purpose and realistically costed.