

2021 Wash Fisheries Economic Assessment

Prepare by MarFishEco Fisheries Consultants Ltd for Eastern IFCA

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For



¹KI interviews, qualitative analyses, data interpretation and report writing

²Quantitative analyses, data interpretation and report writing

³Conceptualisation, data interpretation and report writing



- Contents
- Introduction
 - The Wash fisheries
 - The Economic Assessment
- Methods
 - Landings and sustainability evaluation
 - Permit Distributions
 - Social Networks
 - Key Informant Stakeholder Interviews
 - Crew Salary Estimations
 - Data analysis and graphical outputs
 - Combined Limitations section
- Results
 - Landings and Sustainability Evaluation
 - Licence Distribution
 - Social Networks
 - Stakeholder Key informant interviews
 - Response Rate
 - Characters within the Wash
 - Business models within the Wash
 - KI Opinions
 - KI concerns around sustainability of the Wash
 - Wash fishery sustainability concerns
 - Poor fisheries performance - summarised
 - Wash fishery licencing
 - Stakeholder recommendations for new byelaw
 - KI responses quantitative analyses
 - Economic Assessment
 - MFE responses to questions posed by the Eastern IFCA
- Management - status and future recommendations
- Permit recommendations
- Data collection recommendations
- Concluding remarks
- Appendix
 - Appendix 1. Survey questions
 - Appendix 2. Percentage of landings – selling location



Appendix 3. Any final thoughts on the upcoming byelaw?



Introduction

The Wash fisheries

Eastern IFCA manages several important fisheries in The Wash including the cockle, shrimp, and whelk fisheries. Whelk fisheries are managed under a byelaw (The Whelk Permit Byelaw 2016) and shrimp fisheries are to be managed under the Shrimp Permit Byelaw 2018 once confirmed by the Secretary of State. Whilst Whelk Management is focussed on sustainability of the fishery, the Shrimp management measures are focussed on protecting the habitats over which shrimp fishing occurs.

Management of cockles is via the Wash Fishery Order 1992 (WFO); a 'Hybrid Order' (a regulating and Several Order) established to provide local management of mussels, cockles, clams, scallops, and queens (the prescribed species) within The Wash estuary embayment (known as The Wash) ([ref](#)).

Before the WFO, fishing management measures in The Wash had been defined under a set of Several and Regulating Orders and byelaws approved by the Department for Environment, Food and Rural Affairs (DEFRA) and its predecessors. On the 4th of January 1993, all management measures were combined under the WFO 1992 ([ref](#)). At the time, the Eastern Sea Fisheries Joint Committee (ESFJC) was managing fishing activities within the Wash. However, in 2011, the management of the WFO 1992 was handed to the Eastern Inshore Fisheries & Conservation Authority (Eastern IFCA) ([ref](#)).

The WFO 1992 enables the Eastern IFCA to develop and enforce management measures and regulations to ensure stocks of the prescribed species are fished in an appropriate and sustainable manner. The regulated fishery within the Wash includes the entire Wash embayment except for the le Strange Estate, the private fisheries granted under the WFO 1992, and an area covered by an Eastern IFCA emergency Byelaw (Figure 1). Fishing within the regulated fishery is restricted to those fishermen that hold a licence. Eastern IFCA is in charge of issuing these licences in line with the specific terms outlined in the [2017 Interim policies](#) that state;

- Eastern IFCA will not issue any licences to persons who are not currently entitled to such and will not consider applications from the waiting list.
- Eastern IFCA may consider the issuing of a licence to a person without an entitlement only when the continuation of a business is at risk.
- Changes to vessels named on licence will only be considered where there is a vessel breakdown or a pre-notified vessel replacement.
- Eastern IFCA will investigate changes in the ownership of vessels and changes to people named on any licences to deter any attempted circumvention of the waiting list or moratorium on issuing licences.
- Only fishers with relevant experience and safety training will be permitted to fish under WFO licences to prevent damage to the Wash or unsafe practices.

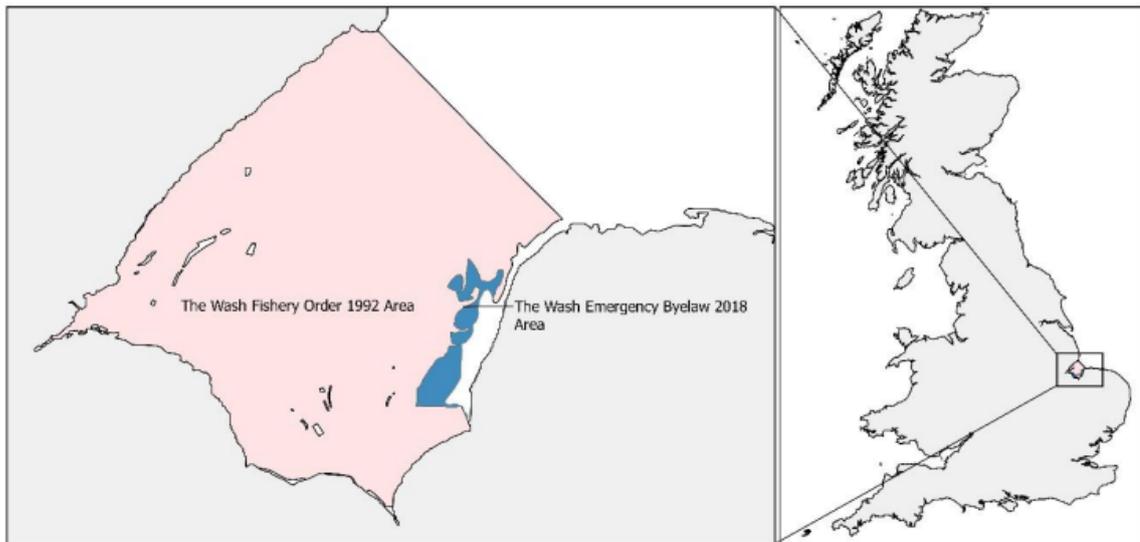


Figure 1. Left figure shows the boundaries of The Wash Fishery Order (white areas represent Lays of the Several Fishery and the blue area shows The Wash Emergency Byelaw 2018 area). Right figure shows the position of The Wash on the British coastline. From [ref.](#)

Under the WFO 1992, a licence for dredging, fishing for or taking any of the prescribed species from a vessel is issued jointly to the applicant, the vessel's owner, and his nominated representative. Therefore, this means that licences are obtained only by vessel owners with the vessel named on the licence, along with a nominated representative that may use the licence on the holder's behalf. Under the WFO 1992, the Order states that *"an application for a licence shall be entitled to have a licence issued to him if;*

(a) in respect of licences for the first fishing year after the coming into force of this Order, he was engaged in dredging, fishing for or taking any of the prescribed species within the regulated fishery as a commercial activity or as part of a commercial activity in the fishing season immediately prior to the date of advertisement of this Order, or

(b) in respect of licences for all subsequent fishing years, he held a licence at any time within the period of 24 months immediately preceding the date of application for the licence" ([ref.](#)).

This means that all fishermen active within the Wash fisheries in 1992 when the WFO was passed, became entitled to a licence to work the regulated fishery if they applied. Today, there are currently 61 licences associated with vessels under the WFO 1992 regulated fishery, all held by vessel owners within the Wash. For those fishermen without a vessel, they must access the regulated fishery either by being a named representative or working on the vessel of a licence holder.

The Economic Assessment

After 30 years of operation, the WFO 1992 is due to expire in January 2023. The Eastern IFCA is currently in the process of developing a byelaw to replace the Order, which is intended to come into effect in 2023. As part of the Eastern IFCA's current work towards the WFO replacement, MarFishEco Fisheries Consultants Ltd have been contracted to produce the economic assessment (herein) of the cockle fishery managed under the WFO 1992. The key purpose of this economic assessment is to understand how many licences (to be implemented under the replacement byelaw to the Order in 2023) the fishery can sustain for a viable, equitable, and successful fishery from an economic perspective (note that licences will be called permits under the new byelaw). To do this, the assessment aims to provide knowledge to help guide the economic, social, and ecological sustainability of the Wash fisheries moving forward.

The main key objectives of the economic assessment include:

- To assess the viability of / Identify if the hand-worked cockle fishery is viable in the context of different varying business models; and
- Identify the optimum level of access (number of permits to fish) within the WFO cockle fishery

Points for consideration within the consultancy are:

- The economic interdependencies between the hand-work cockle fishery and other fisheries prosecuted by the same fleet, taking into account the environmental and stock sustainability pressures on those fisheries
- The economic interdependence between the hand-work cockle fishery and other non-fisheries related sources of income that apply to some business models
- Observations on the impacts of a dredge fishery (economic and sustainability / environmental in relation to other fisheries)

Achieving the above will help enable Eastern IFCA to develop management and policy to work towards a more equitable fishery for all. The aim and objective for managing access to the cockle and mussel fisheries in The Wash are:

Aim: To achieve a level of access to the fishery that is equitable, and which supports the viability of varying business models, the conservation objectives of The Wash and stock sustainability.

Objectives:

1. To limit access to the fishery to a number of persons which will meet the aim.
2. To support effective business planning and continuity.
3. To enable a range of business models to operate within the fishery.
4. To prioritise the continuity of active participants.
5. To enable appropriate permit turnover to create opportunity for suitably qualified new permit holders.
6. To prevent the permit from having its own value or becoming a tradable commodity.

The aims and objectives are set principles. They will shape the development of 'policy and eligibility criteria' which will be used to manage access to the cockle and mussel fisheries in THE Wash after the Wash Fishery Order 1992 expires in January 2023. The final aim and objectives are a commitment to a high standard of fisheries management. They are fair, transparent, and will support sustainable fisheries into the future.

To achieve the aims of the economic assessment, qualitative and quantitative analysis presented herein are undertaken using data obtained through various methods including a baseline assessment of trends and variations in fishery landings and stock productivity abundance; a baseline assessment of licence distributions; and a consultation with industry through key informant (KI) stakeholder interviews. This report presents the findings of the economic assessment and provide the Eastern IFCA with objective recommendations on the likely number of licences that can sustain a thriving fishery within the Wash from an economic perspective. The findings and recommendations will also help in the formation of future byelaws and other management and regulatory tools within the Wash.

Methods

Landings and sustainability evaluation

Data on landings (kg) and effort (hours/soak time/pots/number of tows) from 2014-2021 (provided by Eastern IFCA) were used to assess the sustainability of three of the major target stocks in the Wash Fishery: cockle, whelk, and shrimp.

Significant linear trends were assessed with generalized linear model (glm) fits for both landings, and landings per effort across time. A glm fit was also used to assess the relationship between effort and landings per effort—where a significant negative relationship can be indicative of poor stock status. For cockle, where pre-season surveys were available, we looked at the relationship between total landings for the season and density of adult cockles (pre-season) with a glm fit.

Note: in the statistical graphics we use landings whilst in the KI interviews we use the term catch. They can be assumed to be synonymous as we do not investigate the idea of discards nor bycatch.

Permit Distributions

To assess the distribution of permits with respect to sustainability in the Wash, we examined the relationship between number of vessels per target species versus landings per effort per year. Using a glm fit we tested whether there were significant relationships between vessel number and landings per effort.

Social Networks

Using data from stakeholder KI interviews, we estimated numerous economic parameters associated with the Wash and its major target stocks. These include vessel owner profits, crew costs, fuels costs, average yearly crew salaries (per stock), average daily crew wage (per stock), number of engaged crew (per stock). Data was directly taken from KI interviews or, for vessels with no directly associated values, estimated based on the mean response from all KI interview responses (per stock). For cockle and shrimp roughly, 45% of vessels have associated KI interview data while the other 55% were estimated (Figure 2). However, whelk had far less survey data, with only 25% of vessels accounted for in the survey. Although this highlights that some results should be taken with caution, we are confident that the results presented herein are an accurate representation of the Wash fisheries. This accuracy has been supported throughout our work based on triangulation between data provided by the EIFCA and stakeholders as well as qualitative feedback from fishers in the Wash.

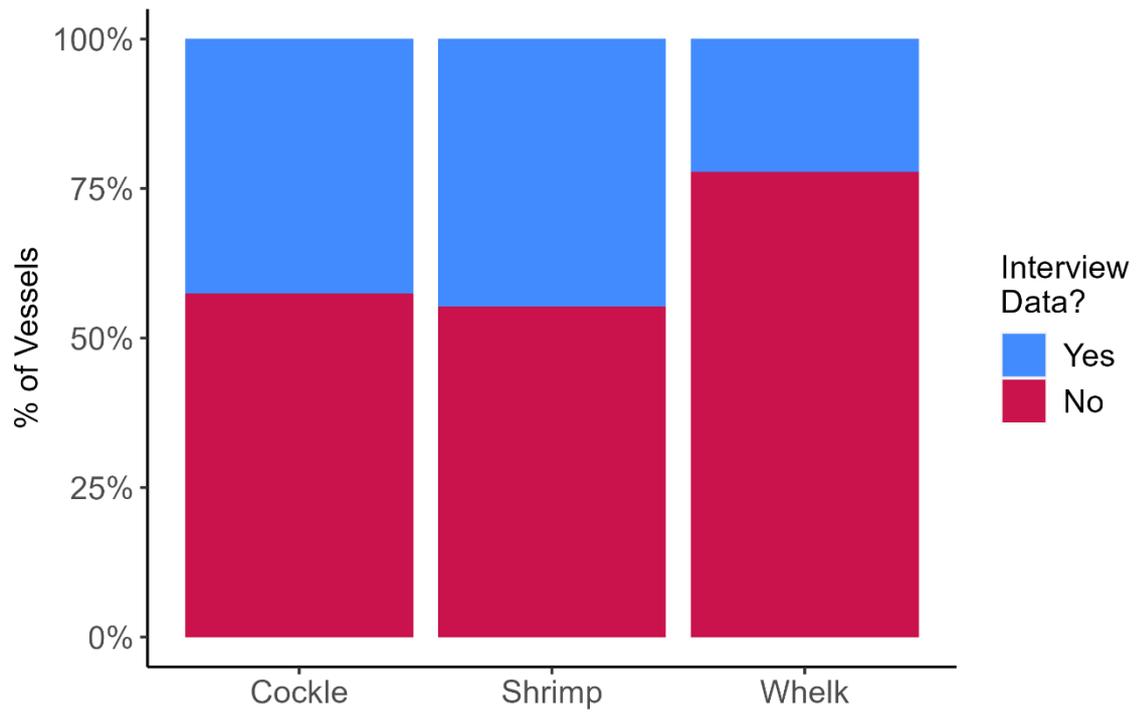


Figure 2: Percentage of vessels per fleet with associated data from KI interviews.

Key Informant Stakeholder Interviews

Stakeholder KI interviews were carried out through semi-structured (phone call) interviews with fisheries stakeholders in and around the Wash. The semi-structured interviews followed a structured survey made up of a standardised list of 65 questions (see Appendix 1. Survey questions) split into four sections:

- Section one; focused on basic KI information such as name, if they owned a limited company, which fisheries they have worked in recent years and if they held a WFO licence.
- Section two; focused on vessel specific information such as vessel age, date purchased and cost, current value, and upkeep costs etc.
- Section three; focused on fishery specific information such as crew make up, pay (share of catch), fishing strategy and length of trips.
- Section four; focused on obtaining financial data such as catch price, business expenses to profit ratio, annual salary, and use of licence as a form of pension. Additional questions in this section also attempt to obtain the opinions of the KIs on sustainability of the regulated fishery and the upcoming byelaw design and replacement of the WFO.

More broadly, the surveys were designed to collect data on the following themes:

- Perceived barriers to accessing the fisheries (qualitative).
- Ideas surrounding fairness in terms of licence distributions (qualitative).
- Social realities and contexts per stakeholder group (qualitative).
- Ex-vessel / market prices of landings.
- Fixed and variable operating costs.
- Crew share of catch (as a percentage).

In total, 102 fisheries KI stakeholders made up the potential surveyable sample population, identified by the Eastern IFCA. However, of these KIs, 12 were missing a contact telephone number. Therefore, the true interview sample size was made up of 90 KI stakeholders. These stakeholders were made up of several different 'characters' within the Wash including processors (n=4), vessel owners (n=32), skippers (n=46), crewmen (n=4) and retired fishermen (n=4). Of the processors, vessel owners and retired fishermen, 35 were licence holders, with 5 holding more than one licence. Most of the interview questions were asked to all stakeholder characters (processors, vessel owners, skippers, crewmen and retired fishermen) in the Wash. However, some questions were specific to processors and those that owned vessels to ensure accurate information was collected. The most common questions that stakeholders were cautious or refused to answer surrounded personal income and operational expenses and profits.

Crew Salary Estimations

Crew salaries were estimated directly from KI interview data. Crew shares were calculated from daily data (estimated landings value times crew share, divided by the number of crew). Fixed costs were also calculated daily as a flat rate. Then, daily estimates per crew member were summed across the entire year to get an estimated yearly salary per crew per vessel per stock.

Estimates for both vessel owner and crew profits were calculated directly from landings data provided by the Wash. For vessel owners both fuel costs and crew costs were subtracted from profits and were based on values derived from KI interviews. Crew costs were estimated based on responses from KI interviews. It is important to note that most crew cost estimates came from employers rather than skippers. This may represent an area of potential error based on secrecy around pay rates. However, crew cost estimates were well aligned throughout the responses and corroborated by the crew members that we did speak directly with. Landings values (£) are derived from mean annual landings from the Wash fishery.

Data analysis and graphical outputs

Key information limited to the fisheries stakeholders within the Wash was uncovered through the KI stakeholder interviews. Key characters and business models at play within the Wash were identified and presented visually through tables and a network diagram corroborated by MFE and Eastern IFCA staff. Patterns in KI stakeholder opinions uncovered by the KI interviews were also explored. KI concerns around the Wash fishery's sustainability, economic future, and the future of the WFO licencing were all visualised graphically. All analyses and visualisations were undertaken in Excel and / or R.

Combined Limitations section

- Some KI responses may not have been honest.
 - It may be argued that some KI responses may have not been accurate due to secrecy issues, or attempts to manipulate the results of this analysis. However, based on triangulation between data sources, we are confident that any “variance” away from true values is minimal because of good alignment between sources (EIFCA, stakeholders and supporting data records).
- Some KI responses may have been poorly estimated.
 - In cases that KIs were unsure of a certain estimate (e.g. what's is your annual expenditure?) we noted this uncertainty and ensured we benchmarked each response against the full “population” of responses to the same question. On very few occasions where there questionable estimates given. In the cases that estimates did seem erroneous they were removed from analyses of that question (only 2 occurrences).
- There were several individuals who chose to not take part in the interviews.

- Although this added to the number of individuals that we did not speak to, we feel that we managed to obtain enough, good quality responses to support the results presented herein. We thank the stakeholders for their time and cooperation with this project.
- Only two out of three processors took part in the interviews. The processors did not answer all of the questions asked due to feelings around sensitive information / privacy.

Results

Landings and Sustainability Evaluation

Landings and effort data was available for three of the major target species within the Wash fishery: cockle, whelk, and shrimp. Management strategies for these three stocks vary, with cockle having the most comprehensive management program (including pre-season surveys and daily and seasonal quotas). Below, we lay out the status of these three stocks and suggest management and or policy recommendations for each.

Cockle

The cockle fishery is the most comprehensively managed stock within the Wash. In 2008, the fishery moved completely away from suction dredging to hand working and the trends suggest that the cockle fishery is currently in a relatively steady state (**Figure 3**).

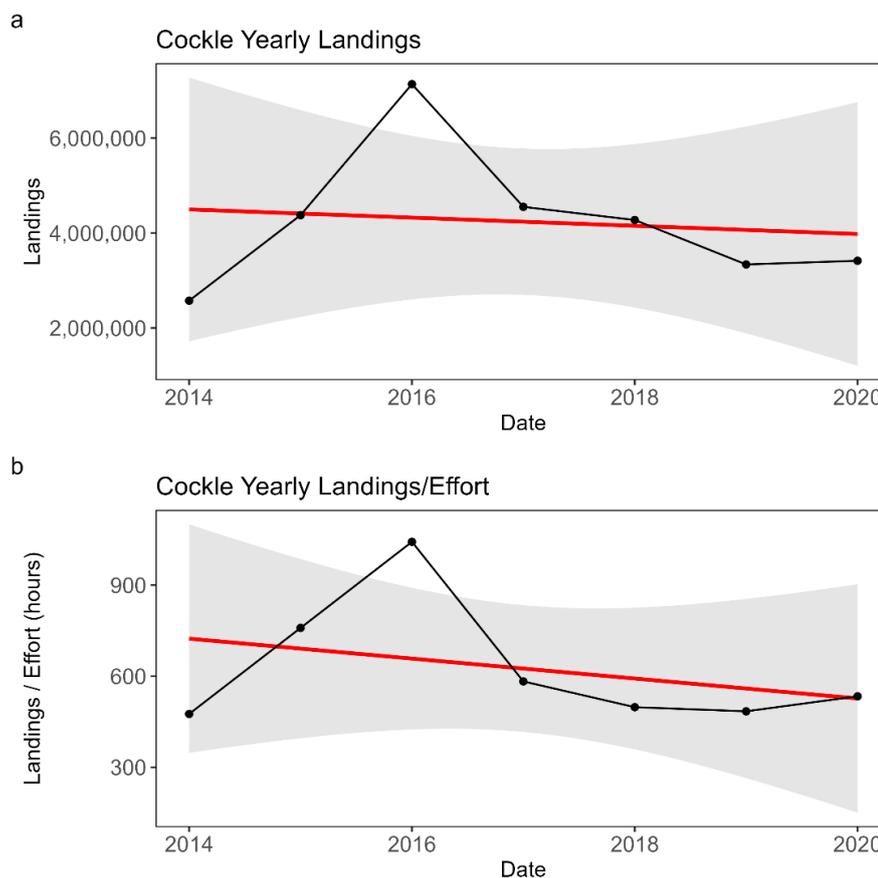


Figure 3. a, trend in cockle yearly landings (tonnes) from 2014 to 2020. **b**, trend in cockle yearly landings (tonnes) per effort (hours). In both figures the red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit.

Both landings (Figure 3a) and landings per effort (Figure 3b) show no significant trend over the last seven years. This is likely in large part due to the pre-season surveys which set a seasonal quota for the years landings. This is shown clearly when you compare the adult density from pre-season cockle surveys with the following years total landings (Figure 4). This relationship highlights the fact that pre-season surveys do a relatively good job of predicting whether a year will have high or low landings. While mid-season adjustments may still need to be made to adjust to the reality within the fishery. Overall, this suggests that the current survey methods are a reliable tool with which to manage the Wash cockle stocks.

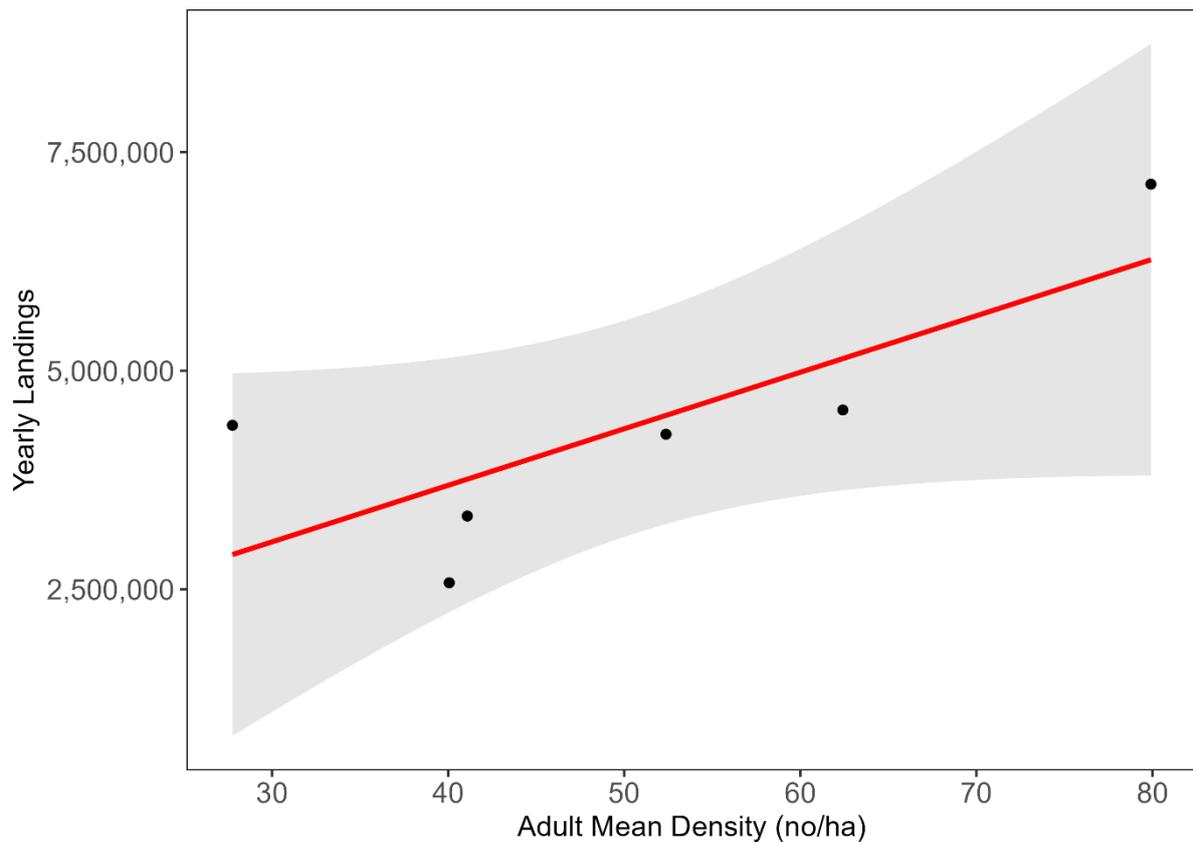


Figure 4: Adult cockle mean density from pre-season surveys versus yearly landings within the Wash fishery. The red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit.

Another metric with which to explore the sustainability of a fishery is the relationship between effort and landings per effort. If the relationship is significantly negative this can be an indication of overfishing—or more simply too much fishing pressure for the stock to reliably handle. Within the cockle we see no significant trend between these two metrics (Figure 5). This suggests that even when there is a lot of effort put into the fishery within a given year, the amount of landings per effort does not significantly go down.

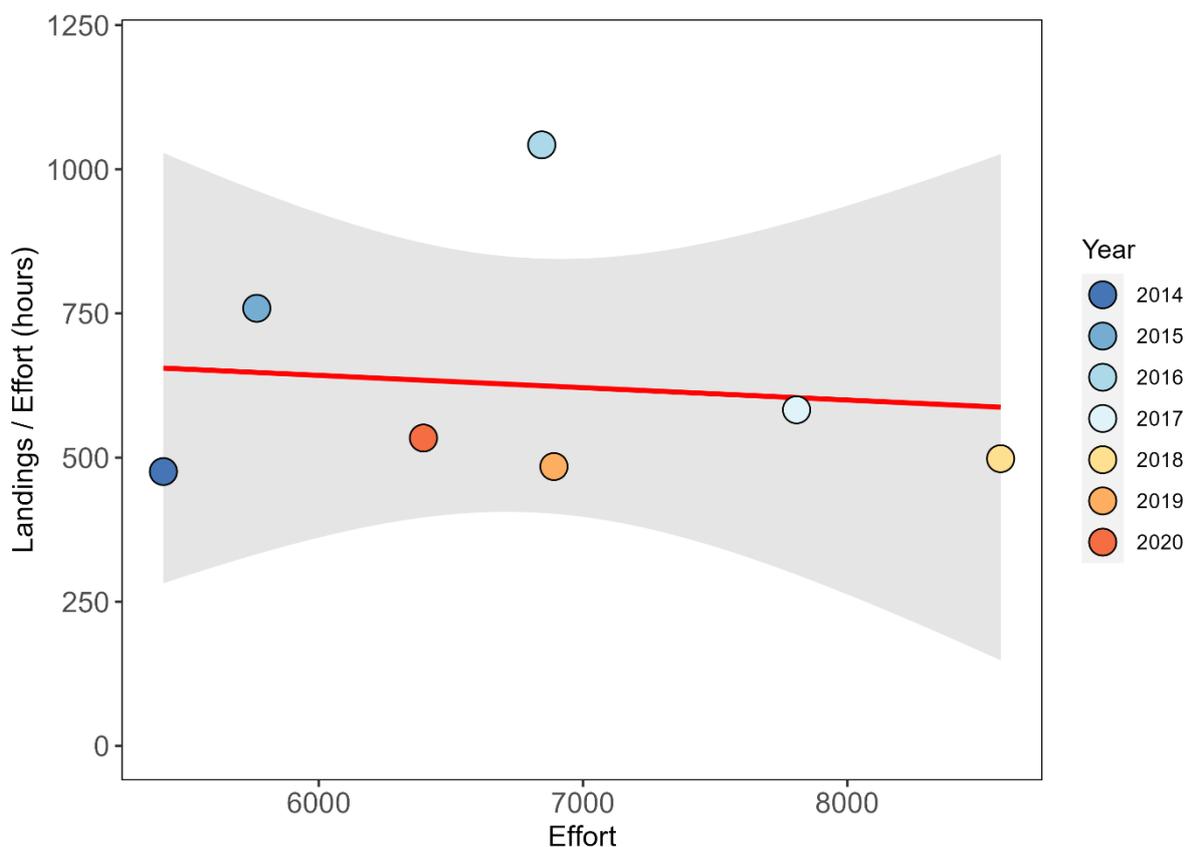


Figure 5: Effort (hours) within the cockle fleet versus yearly landings per effort within the cockle fleet. The red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit. Colours represent each year with data. Note: 2014 is the point furthest to the right.

This information, paired with the relationship between pre-season surveys and landings suggests that the cockle fishery is sustainable. This does not mean that there are not yearly variations in landings, but rather, that the pre-season surveys do a good enough job to estimate the amount of effort that can be put in the cockle fishery yearly without overexploiting the stock.

Cockle Management / Policy Suggestions

- As stated above, management of cockle following the 2008 decision to move to a completely hand-worked fishery appears to have worked well. The current model where pre-season surveys determine the yearly quota also appears to work well. Mid-season adjustments also seem to have helped adjust projections when reality is slightly different to that which was expected from the pre-season surveys. With these management decisions in place the number of licenses is somewhat irrelevant from a sustainability perspective to the management of cockle. Whether there are more or less licenses will not alter the management of the stock if management decisions such

as daily and yearly quotas still rely on a pre-season survey. What will be of more importance here is the equity within the cockle fishery and whether the number of licenses, and / or alternative license structures better distribute wealth among all involved members within the Wash. Assuming catch quotas, changes in the number of distribution of licences may mean:

- Reduced licence numbers
 - Fewer fishers, each with a larger share of the total catch (more revenue per fishing operation)
- Increased licence numbers
 - More fishers, each with a smaller share of the total catch (less revenue per fishing operation)
- Distribution of licences
 - The distribution of licences could take several different forms:
 - Favouring independent fishermen
 - Favouring processors
 - Maintaining a diverse mixture of independent fishermen and processors
 - The distribution will be most easily determined by basing it on the current distribution along with an implementation of new “rules” around licence ownership, such as licence inactivity for a certain period causing a licence to be placed back into a common pool.

Whelk

Unlike cockle, the whelk fishery does not have a pre-season survey. Whelk are fished with pots that soak on the order of hours to days. Effort within the whelk fishery has grown considerably over the past six years (**Figure 6**). Growth in effort within the fishery should be carefully monitored for the whelk stock given that there is currently very little management of the stock. This growth is particularly striking when you look at the total number of pots hauled up in 2020 (185,575) compared to 2015 (746). This is more than a 200-times increase in pots hauled per year within a five-year period.

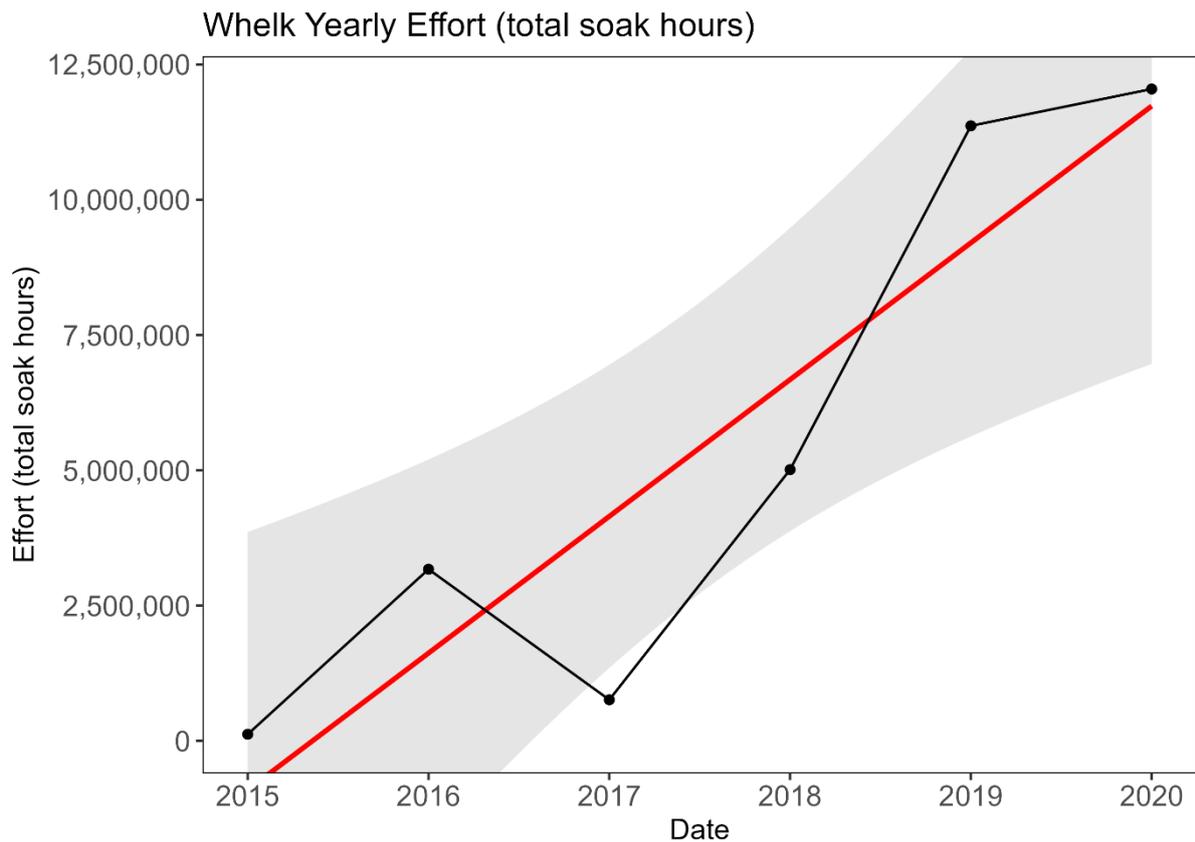


Figure 6: Yearly effort within the Wash’s whelk fleet. Effort is measured by total soak time across all pots. The red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit.

This large change in effort is likely the driver of large fluctuations observed within landings over the last seven years (Figure 7a). These fluctuations are combined with a relatively flat trend in landings per effort, however, the last three years, which showed the highest levels of effort have shown a slight decrease in landings per effort (Figure 7b, p-value > 0.05).

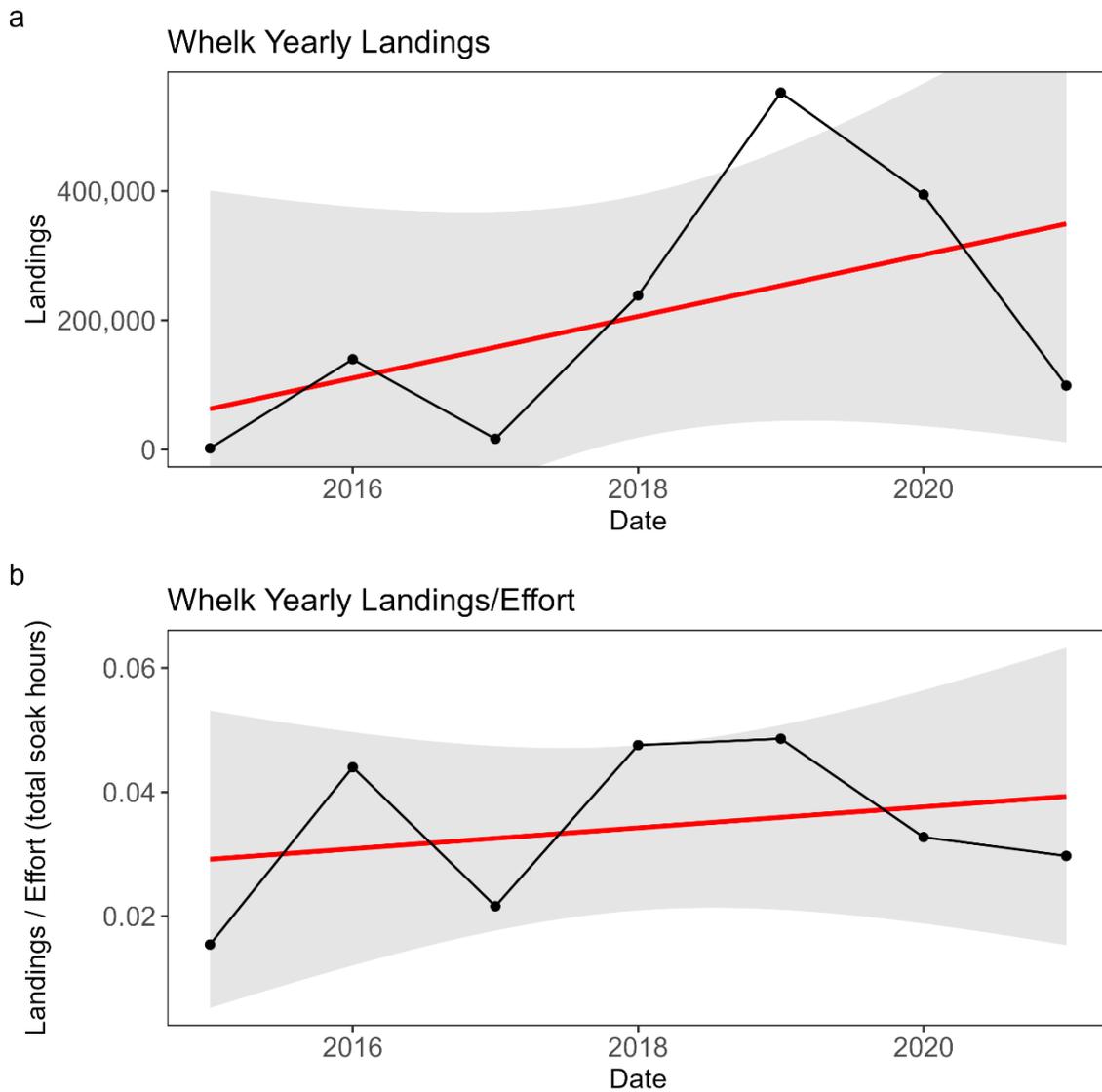


Figure 7: a, Trend in whelk yearly landings (tonnes). **b**, trend in whelk yearly landings per effort (total soak hours across all pots). The red lines in each plot represents a generalized linear fit over the data. The grey areas represent a 95% confidence interval around the fits.

Since no pre-season surveys occur for whelk, our best insight into the sustainability of the stock is to explore the relationship between effort and landings per effort (Figure 8). For whelk, the relationship between effort and landings per effort for whelk is not significantly positive or negative (p -value > 0.05). Higher effort in the fishery has led to relatively consistent landings per effort in the fishery. However, this should be closely monitored as effort has dramatically increased in the fishery in the last three years.

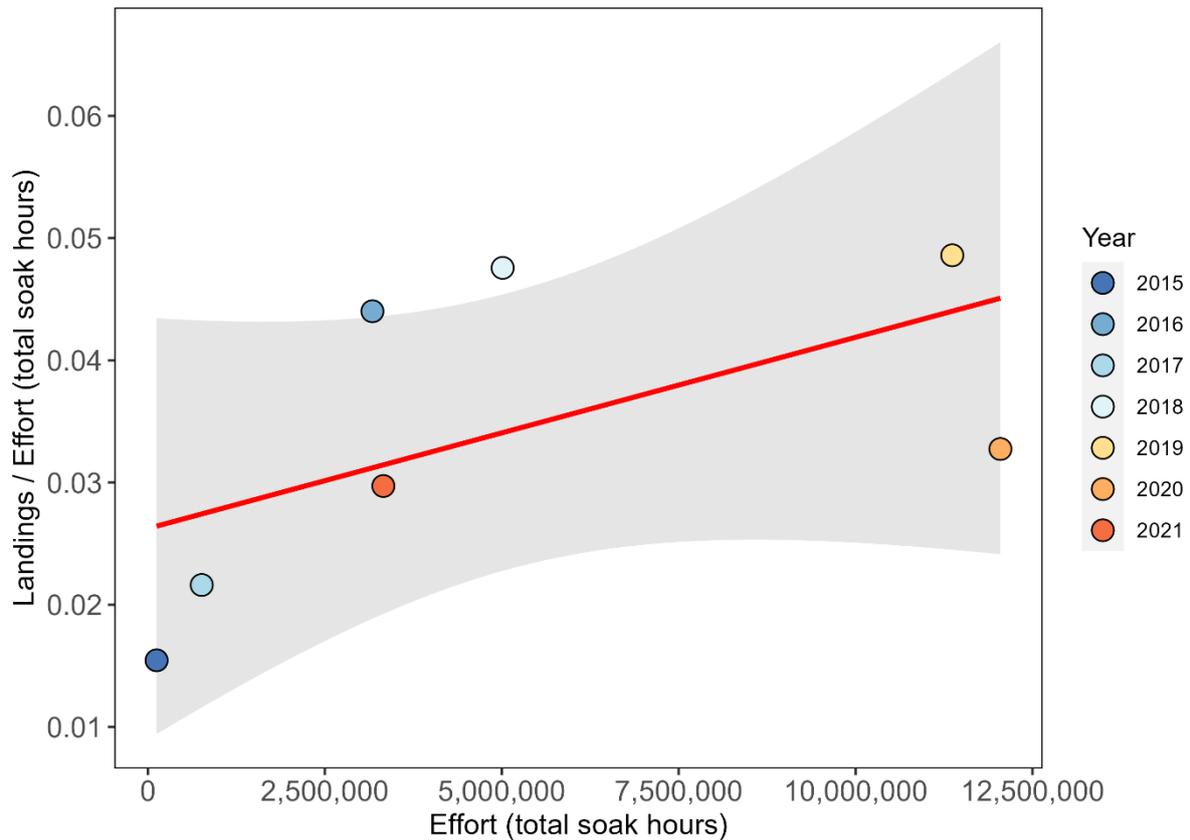


Figure 8: Yearly effort versus landings per effort within the Wash’s whelk fleet. Effort is measured by total soak time across all pots. The red line represents a generalized linear fit over the data (non-significant). The grey area represents a 95% confidence interval around the fit. Colours represent each year with data.

Whelk Management/Policy Suggestions

Sustainability within the whelk fleet should be of primary concern to the Wash fishery. The story is relatively straightforward, an increase in effort within the fishery across the last three years coupled with no limit on permit holders (note: there is a limit on the number of pots per vessel = 500) could quickly put the fishery into a troubling situation. While landings per effort has yet to decline within increased effort, high variability of landings within the fishery should be carefully monitored to assess whether this is the result of natural variability or overexploitation by the fishery in any given year. A pre-season survey like cockle could provide more stability within the system. Given that surveys can be resource expensive, another possibility could be to look at within season trends of landings per effort across the first half of the season. Steep declines in landings per effort within the first half of the season may indicate that too much effort is currently being put into the fishery. Again, we believe that management and policy suggestions should be a multifaceted approach. Licenses, while important for restricting the total number of vessels fishing a given stock, cannot entirely solve a management issue such as the one that appears to be facing whelk within the Wash. A better understanding of the status of the stock, through pre-season surveys, combined with a study

of within season changes in landings per effort will be most useful to provision Eastern IFCA with the information it would need to correctly (more stringently) manage and stabilize a currently unstable fishery.

Previous considerations of the whelk fishery being used as a diversification option to reduce effort on other fisheries does not look like a viable option. Current effort levels already look high enough to be causing issues to the sustainability of the stock and to date relatively few fishers operate in the whelk fishery (approximately 8-10 active vessels) compared to (for example) the cockle (approximately 55 active licences).

Shrimp

Reporting within the Wash shrimp fleet has been highly irregular. As such, total values for effort and landings have not been shown. Below (Figure 9) we highlight the number of vessels that have reported shrimp landing within the Wash for the last seven years. Overall, 10 to 30 vessels report shrimp landings per year and we will use this data to analyse the current sustainability of the fishery given these data restraints.

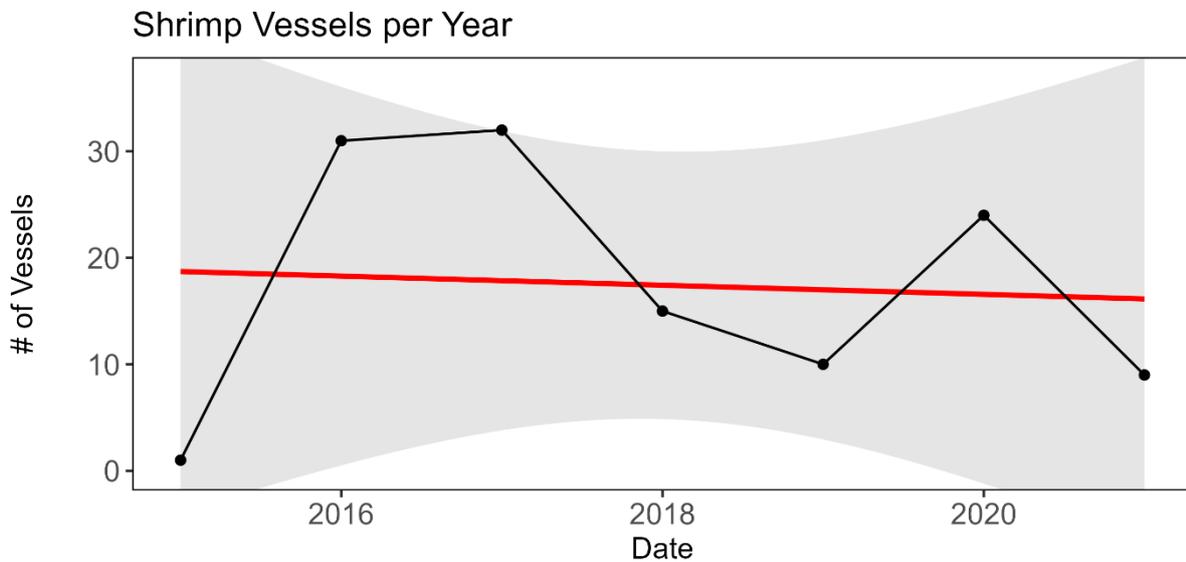


Figure 9: Number of vessels in the Wash shrimp fleet per year. The red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit.

Unsurprisingly, given the variability in the number of vessels that report/fish shrimp each year, shrimp landings are highly variable from year to year (Figure 10a). This variability is likely a reflection of reporting issues rather than an indication of stock status. In contrast, landings per effort within the fishery are relatively stable (Figure 10b). If we assume there is consistent reporting per individual within a given year, there is a subtle increasing, though not significant, trend in landings per effort across the last seven years. This trend could be the result of many factors such as increases in the standing stock biomass of shrimp or increases in total fleet landings efficiency (vessels that have remained in the fishery may be getting better at fishing shrimp within the wash or vessels that are poor at fishing shrimp have slowly left the fishery).

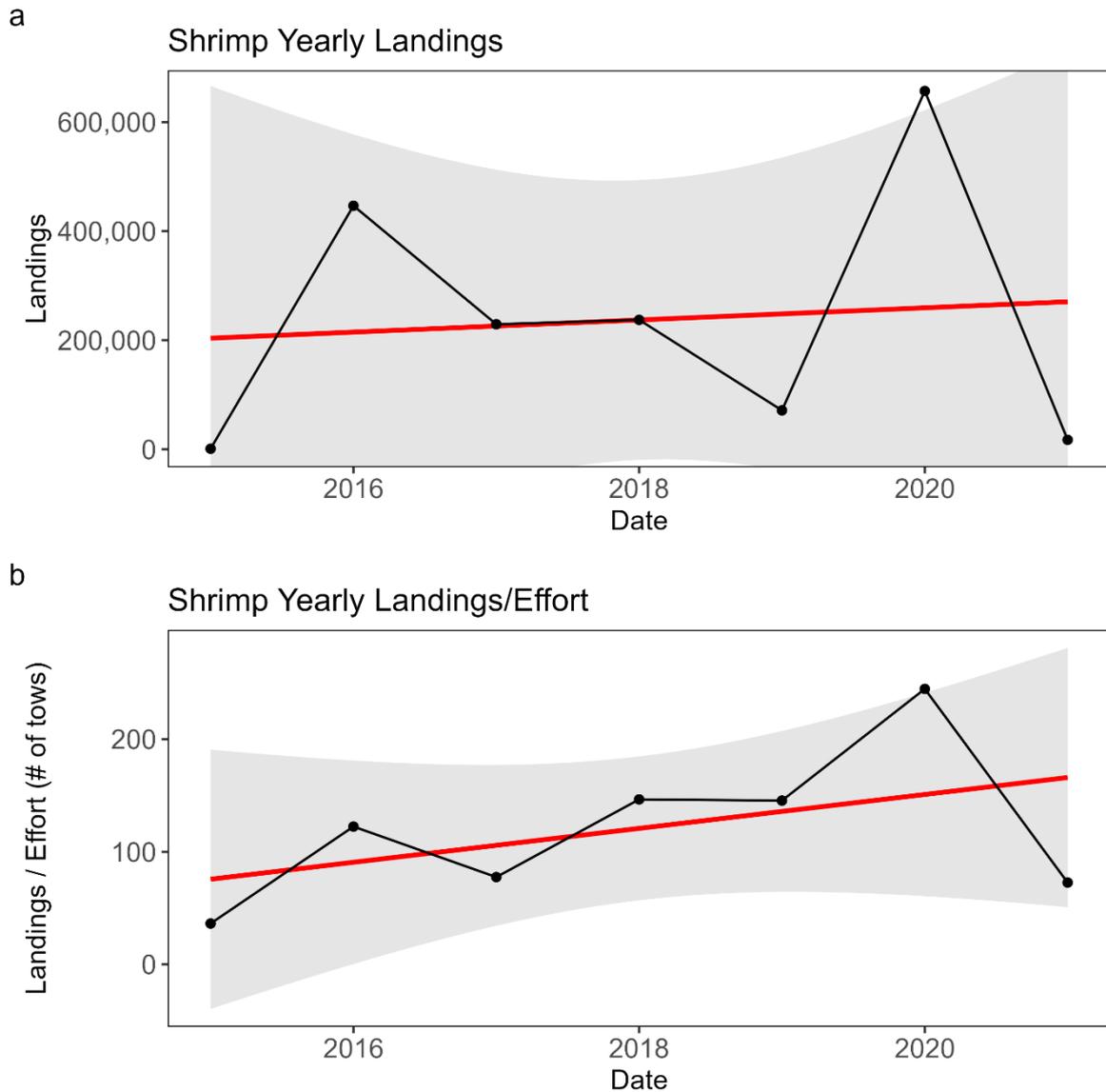


Figure 10: a, Trend in landings (tonnes) for the shrimp fleet in the Wash. b, Trend in landings per effort for the shrimp fleet in the Wash. The red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit.

Looking at the relationship between effort and landings per effort is the best metric to assess the sustainability of the shrimp stock within the Wash. Overall, there is a positive relationship between effort and landings per effort, though this relationship is not significant (Figure 11). This suggests that the stock is relatively sustainable—more effort has had little / no effect on landings per effort.

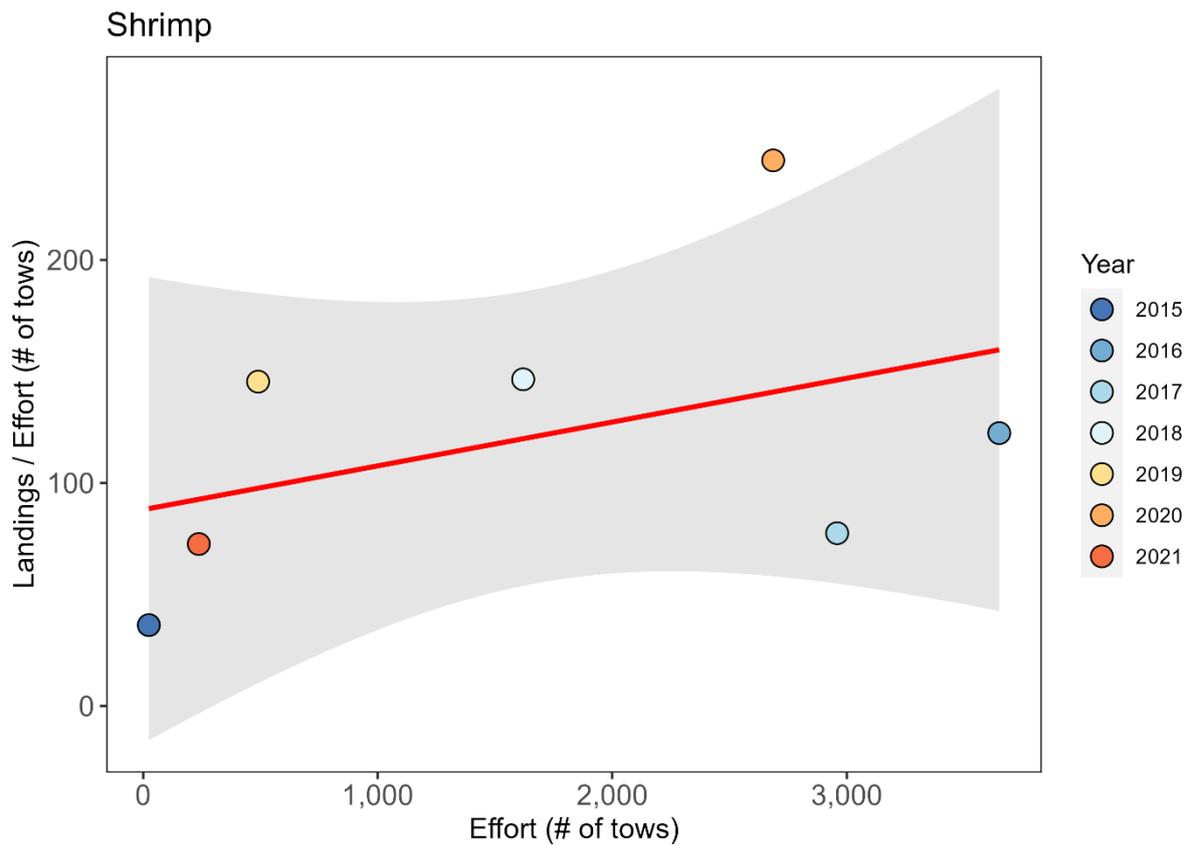


Figure 11. Yearly effort versus landings per effort within the Wash’s shrimp fleet. Effort is measured by the total number of tows. The red line represents a generalized linear fit over the data. The grey area represents a 95% confidence interval around the fit. Colours represent each year with data.

Shrimp Management/Policy Suggestions

The shrimp fishery has been highly variable from year-to-year as both landings and the number of vessels fluctuates widely. This is likely the result of inconsistent reporting within the fishery. Given what data is available and the previously mentioned issues of inconsistent reporting, the shrimp fishery appears to be in a sustainable state. High variability in effort and issues with consistent reporting make assessment of the fishery challenging. However, the relationship between effort and landings per effort suggests that increased fishing pressure has yet to lead adverse results. Primary attention should be directed to ensuring better reporting of landings within the Wash shrimp fishery to get both an accurate assessment of both landings and effort within the Wash shrimp fishery. Additional attention should be paid to the level of effort—if an increase in the number of vessels or the total number of tows occurs over multiple successive years then more attention should be placed on managing the shrimp fishery. Unlike the other two stocks, in its current state, regulation on the number of licenses handed out each season could be a simple way to ensure that the shrimp fishery remains sustainable. At the very least, a cap could be placed on the maximum number of vessels fishing the stock if that number continuously rises in the future.

Licence Distribution

As part of the sustainability assessment of the Wash fisheries, we explored whether the number of vessels (each vessel requires a licence) showed any relationship with landings per effort. If fleets show either no relationship or a positive relationship, this indicates that changes in the number of licences per year has no bearing on the sustainability of a given stock. If a negative relationship between the number of vessels and landings per effort exists, this may indicate that the fishery is / was oversaturated with licences (vessels), leading to reduced sustainability for that particular stock.

Cockle

For cockle we find no significant relationship between the number of vessels and landings per effort (Figure 12). The cockle stock is managed in large part by the pre-season surveys which help determine the yearly quota. Therefore, it makes sense that changes to the number of vessels in the fleet is unlikely to affect the sustainability of cockles within the Wash.

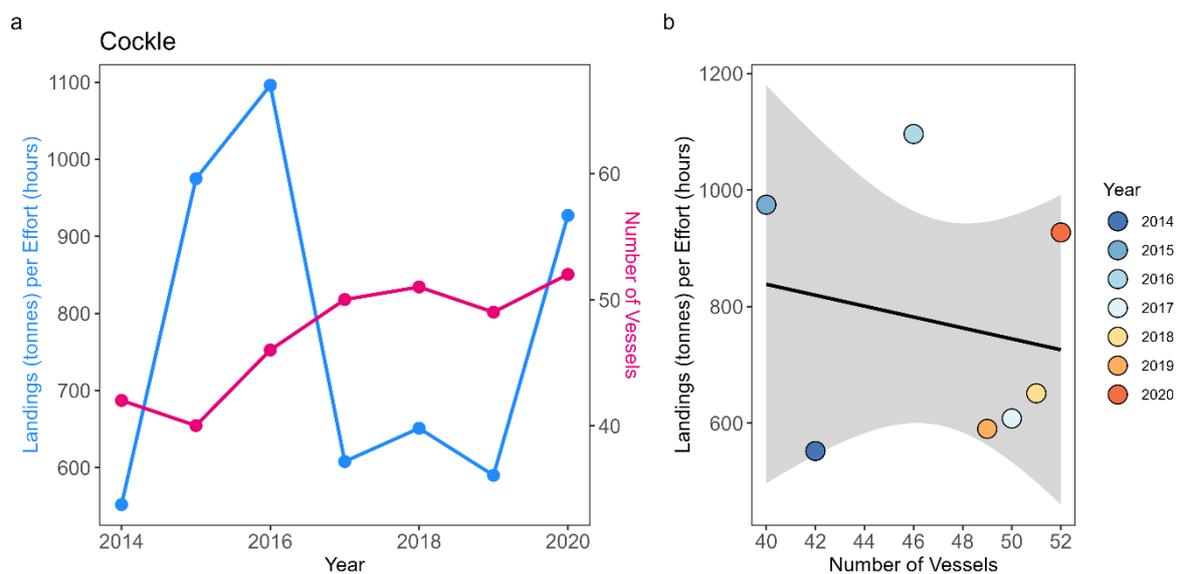


Figure 12: a. Time series of landings per effort and number of vessels per year for the cockle fleet. b. Relationship between number of vessels and landings per effort ($p = 0.67$).

Whelk

In general, the whelk fleet shows a strong alignment between landings per effort and number of vessels (Figure 13a). However, it is important to note that this relationship shifts in 2020; a year when the number of vessels doubled. This growth, combined with the nature of the whelk fishery, a pot-based fishery where the effort by one vessel can far exceed the effort in a hand-worked fishery like cockle, have clearly influenced the landing efficiency of whelk within the Wash. Landings per effort were lowest in 2017, when only one vessel was fishing whelk within the Wash (Figure 13b). That landings per effort were the second lowest when the fleet doubled

in size during 2020 is concerning and landings per effort should be closely monitored over the next few years if this increase in vessels and effort is to continue with whelk.

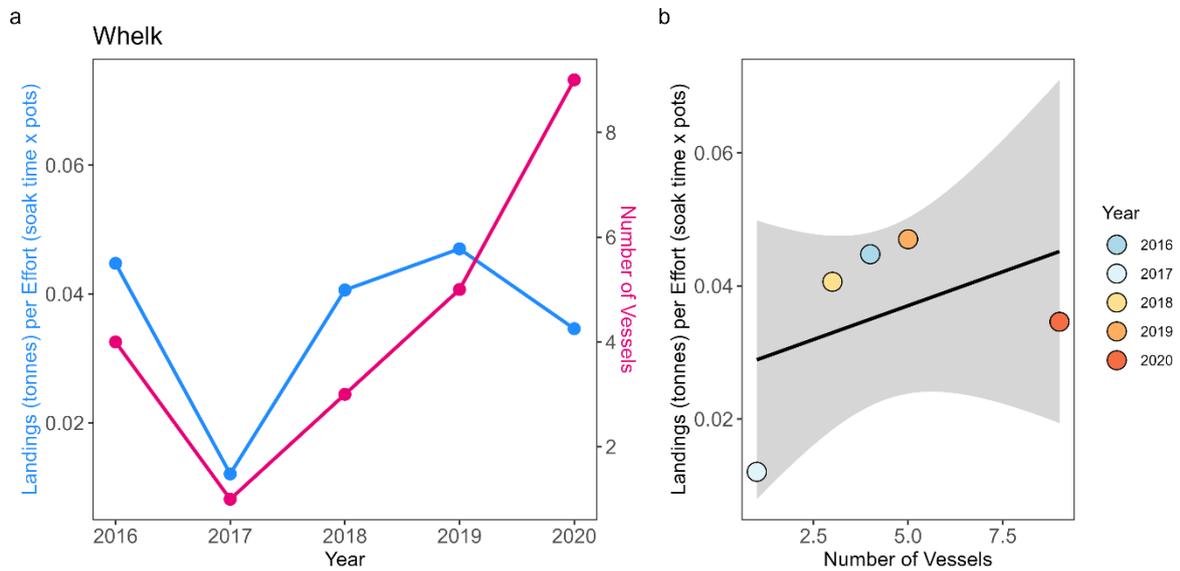


Figure 13: a. Time series of landings per effort and number of vessels per year for the whelk fleet b. Relationship between number of vessels and landings per effort ($p > 0.05$).

Shrimp

The shrimp fleet shows no relationship between the number of vessels and landings per effort (Figure 14). Both landings and landings per effort (Figure 10) are highly variable from year to year within the Wash shrimp fleet as a result of limited reporting. However, this variability does not seem to be related to the number of vessels fishing and or reporting during any given year. This finding may indicate that even with the relatively unreliable reporting, landings per effort within the shrimp fishery may be inherently variable. However, some caution should be placed on this result as more complete reporting is necessary to get a full picture of the shrimp fisheries status.

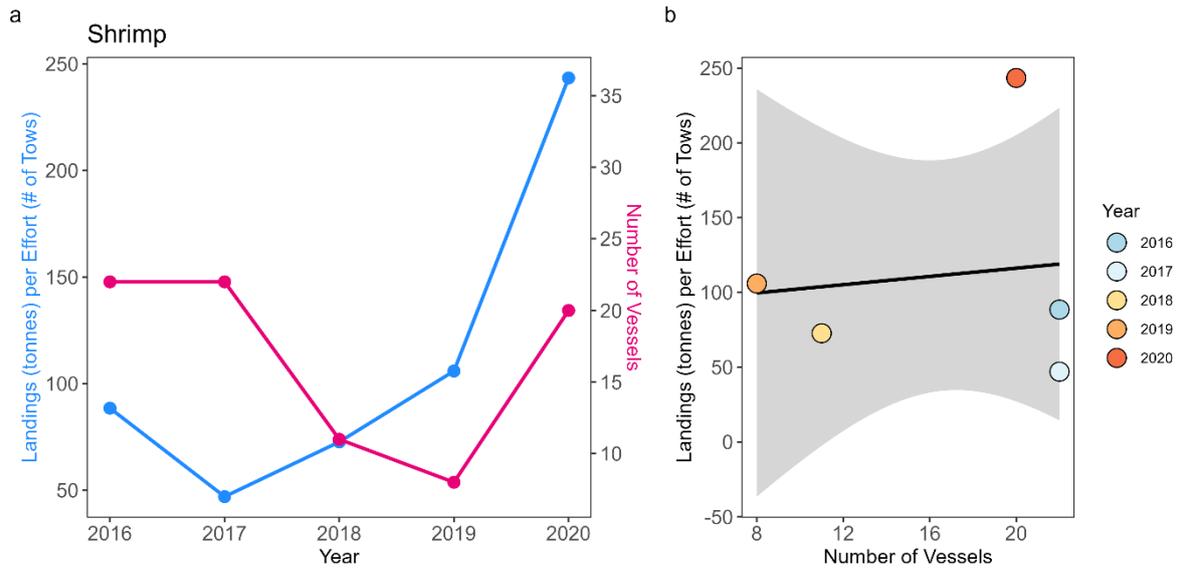
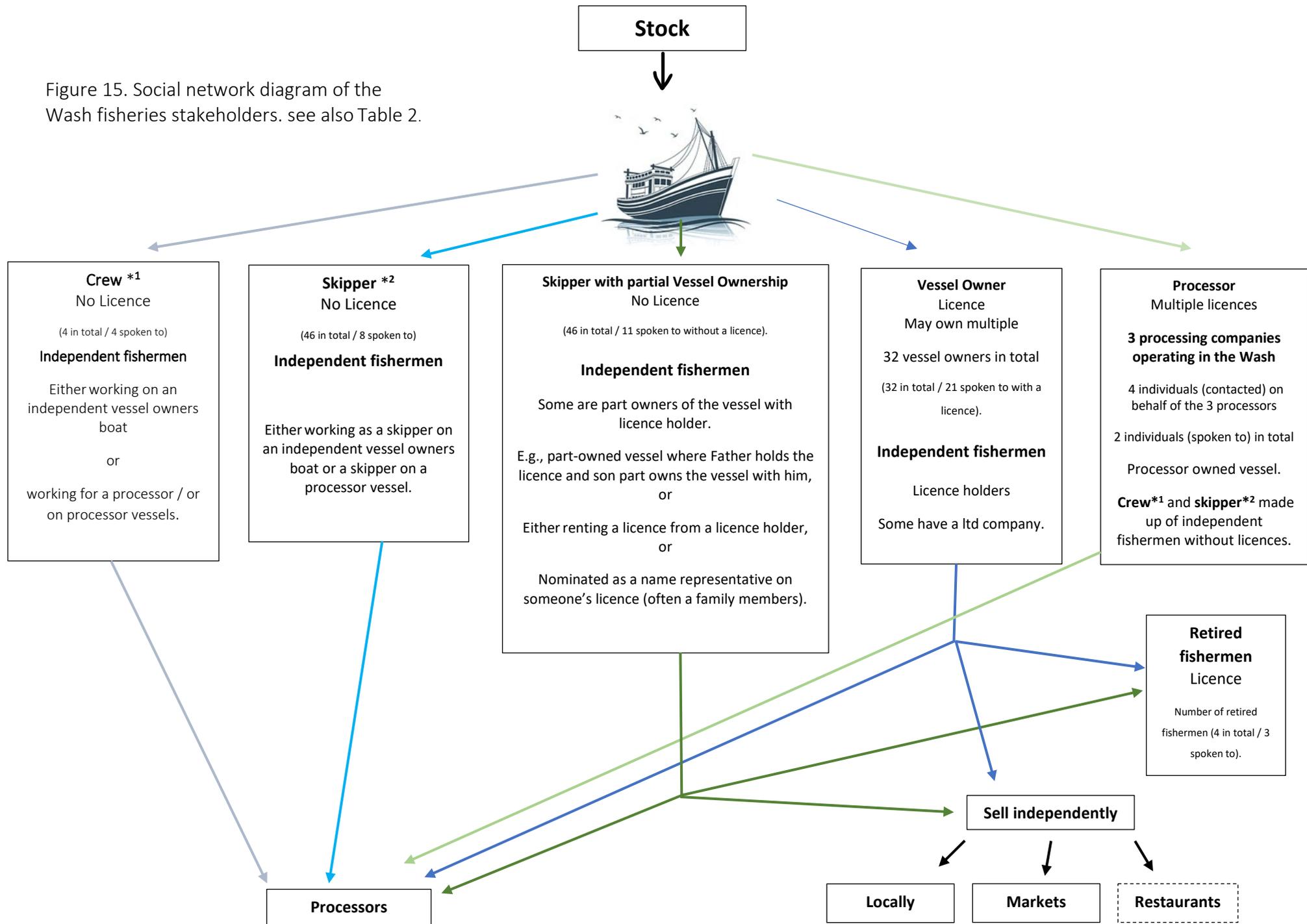


Figure 14: a. Time series of landings per effort and number of vessels per year for the whelk fleet. b. Relationship between number of vessels and landings per effort ($\rho = 0.85$).

Social Networks

To better understand the social context of the fishery we have produced a social network diagram that shows the organization and relationships within the WFO (Figure 15). This diagram was drawn based on our baseline understanding of the Wash fisheries, conversations with stakeholder KIs and corroborated through conversations with Eastern IFCA staff. The diagram shows the different types of "characters" in the Wash fisheries, the numbers of each in total versus the number that we interviewed and where / how each monetises their catch.

Figure 15. Social network diagram of the Wash fisheries stakeholders. see also Table 2.



Stakeholder Key informant interviews

Response Rate

Of the 90 KI stakeholders that made up the survey sample, 11 chose not to take part in the KI interviews and 30 were unreachable following several unsuccessful attempts to call (12% and 33% of the total 90 stakeholders respectively). 49 KIs did take part in the interviews, resulting in a successful survey response rate of 54%.

Table 1. The breakdown of 'character' responses taking part in the KI stakeholder interviews. For each 'character' within the Wash (processor, vessel owner, skipper, crew and retired fishermen). * the number of licence holders that we spoke to overall is noted in the last row.

Character	Number contacted	Number interviewed	Number declined	Number interviewed fully	Number that refused certain questions
Processor	4	2	2	0	1
Vessel owner	32	21	2	-	-
Skipper	46	19	6	-	-
Crew	4	4	0	-	-
Retired fishermen	4	3	1	-	-
Licence holders*	35	23	4	-	-

Characters within the Wash

From the baseline knowledge, KI interviews and discussion with Eastern IFCA staff, five 'characters' working in the Wash were identified, including processors, vessel owners, skippers, crew and retired/ inactive fishermen (Table 2). Of the 49 KIs that took part in the interviews, 2 were processors (4%), 21 were vessel owners (43%), 19 were skippers (39%), 4 were crew (8%) and 3 were retired fishermen (6%). Furthermore, of the 49 KI's, 23 were found to hold licences to access the regulated fishery under the WFO 1992. Altogether, the 23 licences holders hold 31 of the 61 licences currently issued by Eastern IFCA, with 19% held by processors (n=6), 71% held by vessel owners (n=22) and 10% held by retired fishermen that are mostly inactive in the Wash (n=3). It should be noted that although it is preferable to label individuals with a specific character, the reality is a lot more complex. Often one individual may be described across multiple characters, for example: an individual may skipper a vessel, own a vessel and also act as a crewman in other circumstances. For this reason, the idea of character

descriptions should be taken with some caution and are used herein to help describe general patterns in the fishery. We do, however, appreciate that in reality there are a diverse set of different scenarios in which an individual can interact with the wash fisheries.

Table 2. Characters/occupations working the Wash regulated fishery.

Character	Description	Licence information
Processor	Companies that process fish from the Wash. Sorting and preparing the catch for onward sale. Processors either buy catch from independent fishermen or have inhouse vessels and crew that work the fishery.	They often hold multiple licences attached to company vessels. (note: there are only two such licence -holding processors in the Wash fishery)
Independent vessel owner	Independent fishermen that own a fishing vessel. In some cases this does include family-run businesses	Individual owns a vessel to hold a WFO licence. applied.
Skipper / share fishermen	Fishermen that skipper a vessel (but don't own the vessel). Vessel owners may also be skippers of their own boat. It should be noted that some skippers may also hold shares in a vessel and consider themselves a beneficial owner	Can be a nominated representative on a licence held by another fisherman.
Crew	Crew make up fishermen that are either employed on a vessel in the Wash or work as self-employed share fishermen.	Often crew are not linked to a licence. They are unlikely to be named as a representative on someone else's vessel. Instead, they may work onboard a licence holders vessel.
Retired / inactive fishermen	Independent fishermen that have retired and are mostly inactive in the Wash fishery.	For those that are licence holders, some retain their licence in retirement to allow their nominated representative to continue accessing the fishery. Others may enable access to their fishery via their licence through a range of relationships.

Business models within the Wash

The KI interviews identified several different business models operating within the Wash based around the 1992 WFO and the subsequent licence scheme (Table 3). The business models appear to operate around gaining access to the regulated fishery through those that hold a licence. As with the 'characters' above, delineating distinct business models is not a clearcut task. Many individuals can potentially fall into more than one business model and many of the individuals we spoke to described themselves as one business model whilst others with the exact same operational behaviour in the Wash fishery would describe themselves otherwise. For this reason – later in the analyses we simplify the classifications / groupings of individuals into (for example) nominated individuals versus other (vessel owners and processors) to simplify the comparison between models and provide sufficient numerical replication to facilitate plotting meaningful graphics (see Figure 16 – that shows the aforementioned simplification).

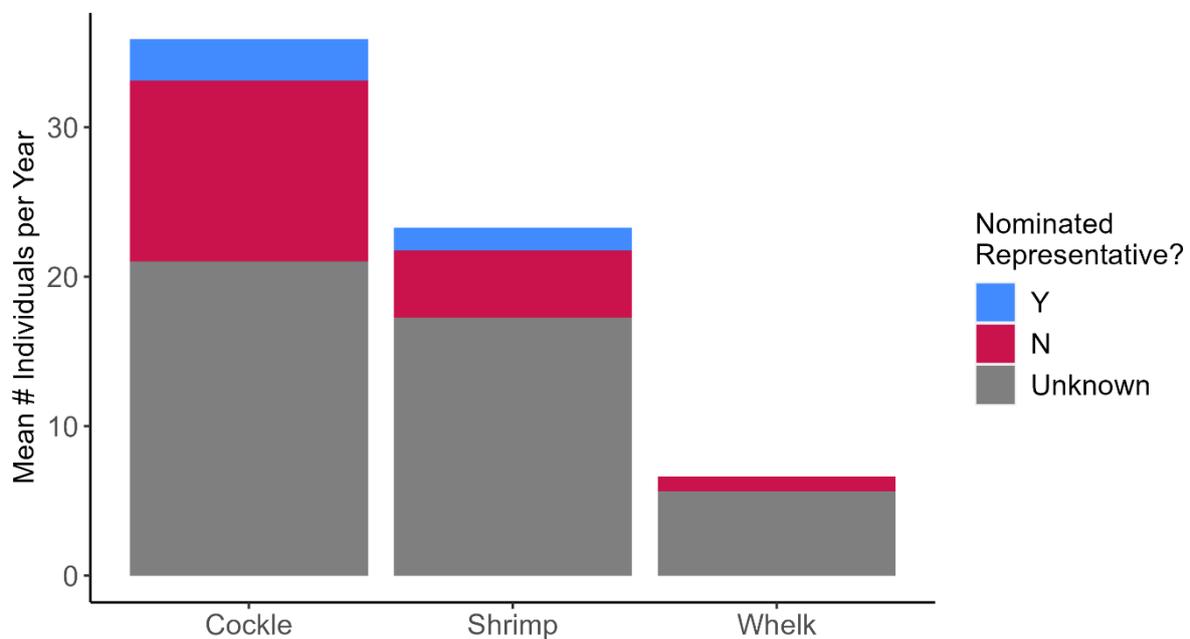


Figure 16: Mean number of individuals per fishery per year that are either: a nominated representative (Y), licence holder and vessel owner (N), or whose status is unknown.

The business models identified are:

- Processors that hold multiple licences working with skippers / share fishermen (crew and skippers) without a licence.
- Independent fishermen that hold their own licence.
- Share fishermen that do not hold a licence but are accessing the fishery by working as a nominated representative on someone else’s licence.
- Retired or inactive fishermen that still show ownership a licence and may provide fishery access to others through a range of different relationships. (note: this provision of access can also occur with non-retired / active fishers who provide their licence to others to allow them fishery access).
- Independent or skipper / share fishermen that rent a licence from either a retired or inactive fisherman.
- Independent fishermen working as crew or skipper for processors on a self-employed basis.

Note: a graph showing where fishers sell their catch can be found in Appendix 2. Percentage of landings – selling location.

Table 3. Business models operating within the Wash regulated fishery.

Business model	Description
Processors working with independent fishermen	Processors often own multiple vessels with licences attached. The crew and skippers of these vessels are often made up of self-employed share fishermen that do not hold a licence.
Independent fishermen who own a vessel and hold a licence	An independent fisherman with a licenced vessel. Many have limited companies set up within the Wash.
Nominated representatives / skippers / share fishermen	Independent fishermen that are named as a nominated representative on someone else’s licence. This is often a family member.
Retired or inactive licence holders	Fishermen that have either retired or are no longer active within the Wash fishery, yet still hold a licence under the WFO. Often these fishermen retain their licence to allow their nominated representative to continue using the licence. Alternatively, some provide others with access through their own licence ownership.
Independent fishermen that provide others with access through their own licence.	Fishermen that provide access to other fishers using their own licence. To access the fishery, some agree to use the licence of others through a number of different relationships.
Independent fishermen working as crew or skipper	Independent fishermen often work on a self-employed basic on a licenced vessel. This can be on a processor’s vessel or an independent fishermen’s vessel.

KI Opinions

KI concerns around sustainability of the Wash

When asked the question “*Are you worried about the sustainability of the Wash fishery? And Which one?*”, 79% (n=39 of 49) of KI’s raised concerns about the sustainability of the Wash in some way. Furthermore, of the 23 licence holders interviewed, 91% (n=20) raised concerns about the sustainability of the Wash in some way, compared to 13% (n=3) that stated they were not concerned.

The concerns around sustainability focused on four fisheries within the Wash including the cockle fishery, the whelk fishery, the shrimp fishery, and the mussel fishery. In total 55 specific concerns were raised by the 49 concerned KI’s. 24% focused on the entire regulated fishery in general (n=13), whilst around 33% focused on the cockle fishery (n=20), 22% focused on the shrimp fishery (n=12), 11% focused on the mussel fishery (n=6) and 5% focused on the whelk fishery (n=3). Around 2% of sustainability concerns also focused on crab and lobster in the Wash (n=1). Overall, most concerns surrounding sustainability in the Wash focused on the cockle fishery, followed by all fisheries, the shrimp fishery, the mussel banks, the whelk fishery and crab and lobster numbers (Figure 17). Concerns raised by WFO licence holders alone follow a similar pattern in terms of the number of concerns for the individual fisheries, however, they raised more concerns for the entire regulated fishery as a whole (Figure 18).

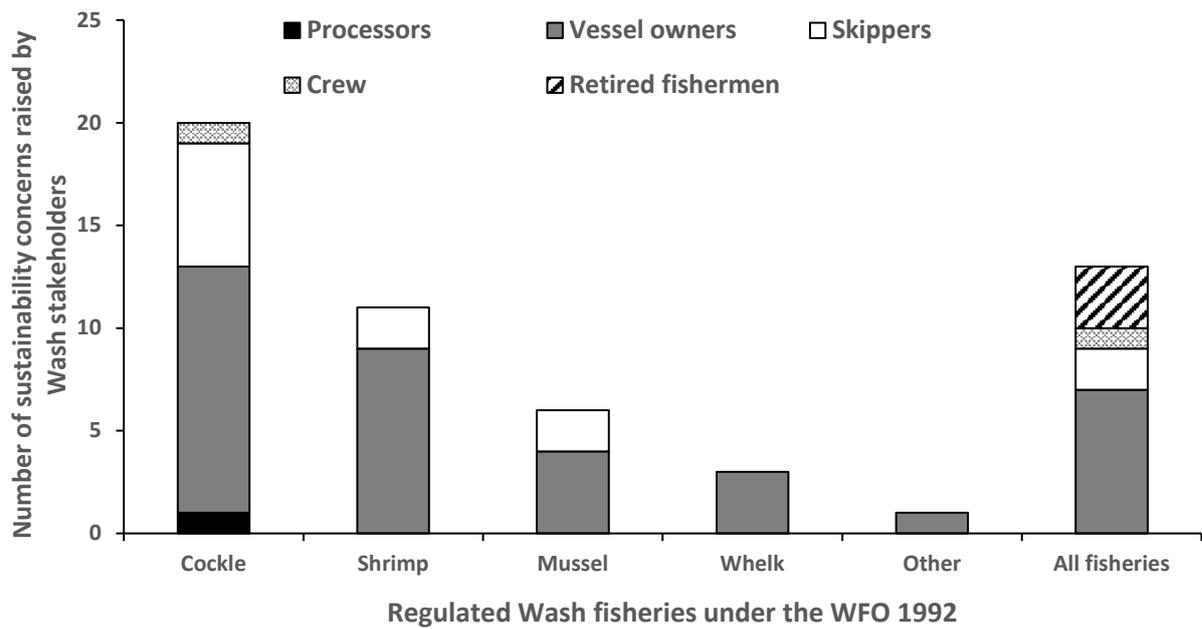


Figure 17. Bar graph showing the number of sustainability concerns raised for each fishery within the Wash during the KI interviews, separated by 'character' type.

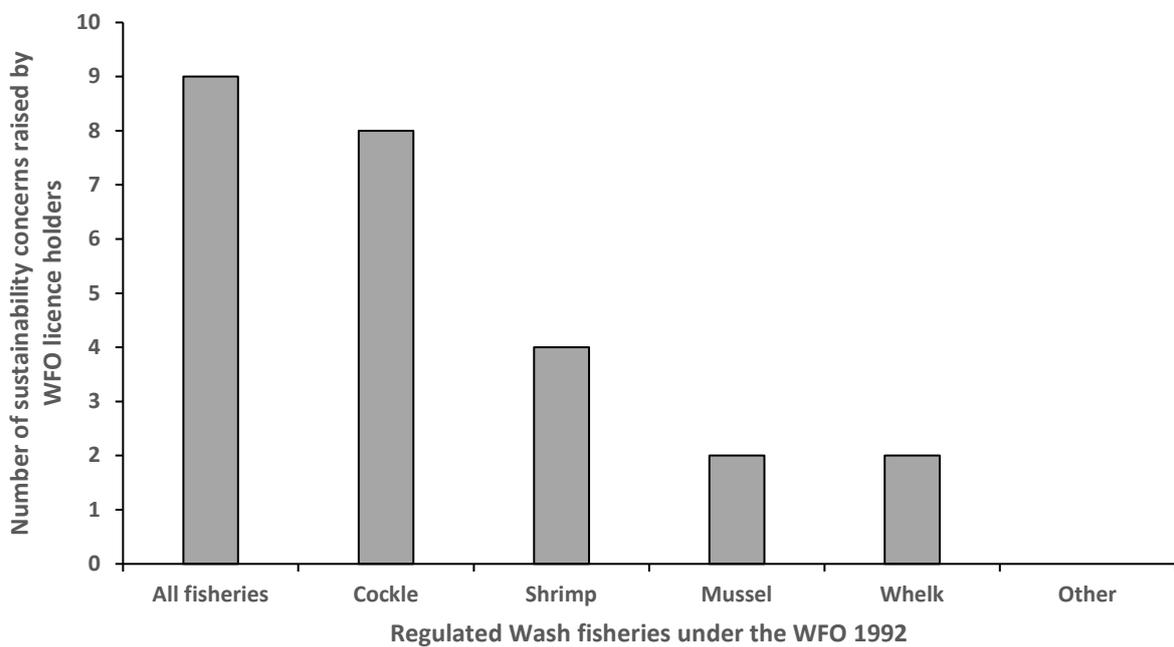


Figure 18. Bar graph showing the number of sustainability concerns raised by WFO licence holders, separated by the regulated fisheries within the Wash.

Wash fishery sustainability concerns

Sustainability concerns were largely consistent across each character type but did vary based on the fishery in question. General concerns shared across all fisheries were worries regarding an increase in the number of vessels (and therefore competition) impacting seabed integrity and stock sustainability over the long-term as well as suggested mismanagement from Eastern IFCA. This mismanagement was generally focused on poor choices regarding opening and closing times of the cockle fishery. Several respondents also noted that although conservation is necessary a better balance needs to be met between the fishery stakeholders and the conservation “agenda” of Eastern IFCA. One individual noted that this may be helped if industry were given more representation on the committee. Problems with non-fishery factors such as agricultural run-off pollution were also mentioned but did not feature heavily in responses in general.

Cockle-specific concerns were highly uniform across responses. Too many fishers operating on restricted grounds was noted as impacted spat fall and having significant negative consequences on subsequent years recruitment. The increased pressure from too many vessels was also blamed for the generally smaller size of cockles that have been caught in recent years, exacerbated by opening and closing times in the fishery. Some respondents noted additionally that processor pressure drove this smaller sized catch. Several individuals suggested that beds should be opened earlier to reduce the risk of dying off and a resultant whilst others noted that the amount of cockles available in the fishery each year should depend on their health not just the 1/3 division for birds, stock and fishery. The blow-out method was also noted as a concern because the cockles that are unpicked are unable to rebury before the next tide and subsequently die / are removed from the fishery. One respondent noted fears about the return of suction dredging which would push people out of the fishery over the long-term.

Whelk-specific were few but all focused on the need for a more stringent pot limit (the current limit being too high). Some alluded to the fact that the Eastern IFCA are already struggling to police / maintain the current pot limit and more controls are needed to manage compliance.

Shrimp-specific concerns focused on pressure put on the fishery from the high number of vessels operating and increased fishing efforts - long, intensive fishing hours, lack of rest for the grounds, increased number, and size of vessels, use of heavy gear and overfishing, often in times when shrimp are carrying eggs. One respondent noted that if the cockle fishery does poorly in coming years, they worry that the shrimp fishery will be used to try and compensate for this which will impact the shrimp fishery further.

Mussel-specific concerns were few (largely based on the low number of mussel fishers we spoke with) and focused on poor management, indicating that the lack of available mussels was largely caused by incorrect fishery opening times. One respondent also felt that the mussel beds have still not recovered from the dredging in the early 1990's and went on to note that if recovery does happen, the mussel fishery should be hand worked moving forward to ensure sustainability. Contrary to this, another respondent noted that the lack of farming on some

mussel banks has meant the banks are “rotting” and the Eastern IFCA needs to do more to improve this situation.

Poor fisheries performance - summarised

When asked about the historic performance of fisheries, there were varied responses (Figure 19). A lack of cockles was the most common reason given for poor fishery year performance. When asked to elaborate on this response, many of the stakeholders noted that there were just not enough cockles to go around. Such responses clearly secondarily relate to the TACs that are set by Eastern IFCA and the number of vessels fishing the cockle stock per year. Complaints about management and regulations mostly revolved around the Eastern IFCA being too stringent regarding the opening times of the fisheries as well as the TACs set. It is important to remember that the data we present in the Landings and Sustainability Evaluation section shows that the management of the cockle fishery appears to be working well at current effort levels. Those who noted poor performance years was related to the economics regarding poor market prices and resultant low profit margins for fishers. The few that mentioned fishing methods as a cause for bad years related to the blowing out of cockles which was claimed to have a big impact on spat success and the resilience of the fishing grounds (small cockles are not given enough time to re-bed / attach before the tide rises). This was blamed for the young age of many of the cockles on the grounds (very few being over 1 year old – a suggestion from one respondent).

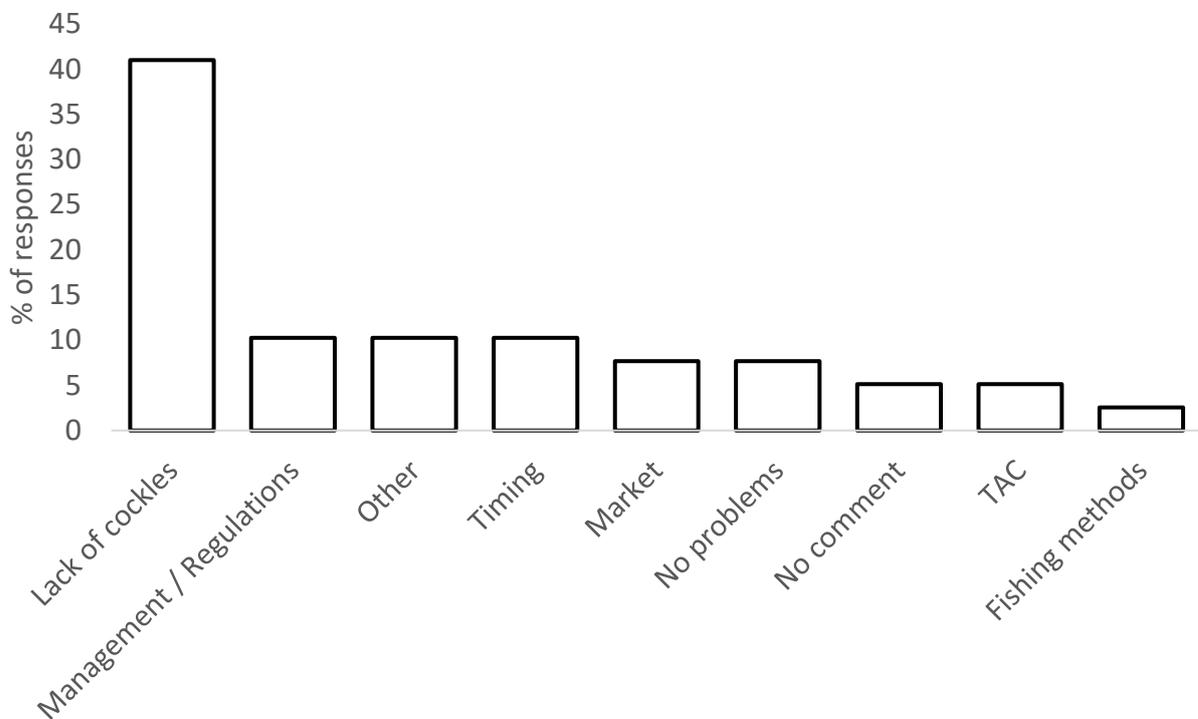


Figure 19. Bar chart illustrating the reasons Wash fishery stakeholders believe there has been poor landings in past years (n=39).

Within the cockle fishery, individuals' perception of the fishery's status (good/bad) was often related to the business model they worked under. Here we define the percentage of years perceived as bad as the number of years perceived as bad (by an individual) divided by the number of years they have fished in the Wash in total. Overall, individuals that were only nominated representatives working on vessels owned by others (other fishers and processors) perceived a higher percentage of the years as 'bad' compared to individuals that were independent vessel owners. Nominated individual also stated that they took home lower salaries compared to most independent vessel owners.

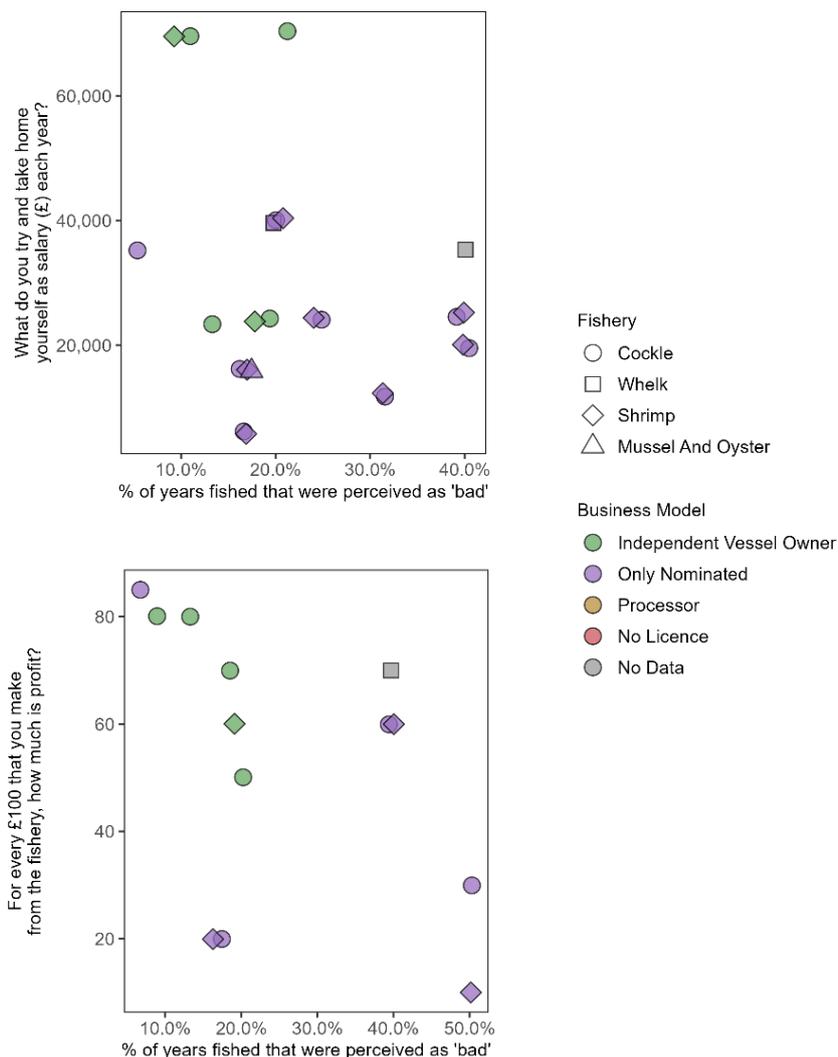


Figure 20: The relationship between how fishers perceive the fishery (bad/good) and their income. Fisheries are represented by different shapes: Cockle (circle), Whelk (square), Shrimp (diamond), Mussel and Oyster (triangle). Different business models are represented by different colours: independent vessel owner (green), only nominated (purple), processor (gold), no licence (red), no data (grey)

Wash fishery licencing

When asked to comment on the current licencing system within the Wash, many respondents did not respond or stated, “no comment”. The most common reason stakeholders gave that the licencing system is not a good system was related to a lack of renewal / refresh in which the Eastern IFCA looks at the licence ownership and evaluates licence use. Some stakeholders noted that licences can be held onto for too long without “real” use (e.g., renting or sat dormant). The next most common complaint was that there were just not enough licences available for Wash stakeholders. This statement obviously needs to be carefully considered based on the sustainability analysis – more licences without increased management restrictions could well lead to the over-exploitation of some fisheries – particularly those that do not operate using TACs or those that potentially have non-compliant behaviour within them. More specifically a few stakeholders noted that they had been excluded from obtaining a licence because the current system does not help young fishers enter the fishery, so they are often left renting from inactive fishers that own licences or working as crew on other vessels.

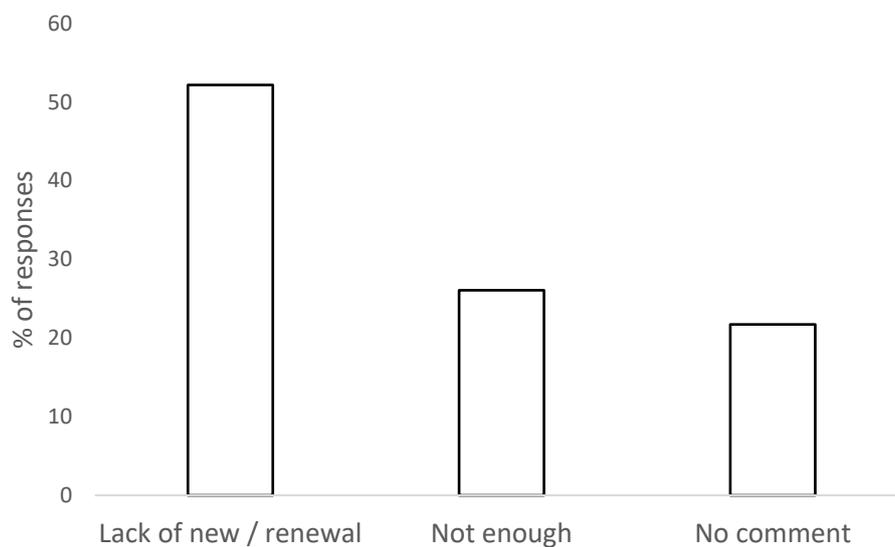


Figure 21. Bar chart illustrating the opinions of Wash fishery stakeholders regarding the current licencing system used in the Wash fisheries. (n=23)

We also spoke to the Wash stakeholder about their thoughts related to the renting of licences and the fact that some have retired but held onto licences as a means of personal income. Very few respondents actively noted that they planned to use their licences for their retirement, however, many did not answer this question or responded with “no comment” (Figure 22).

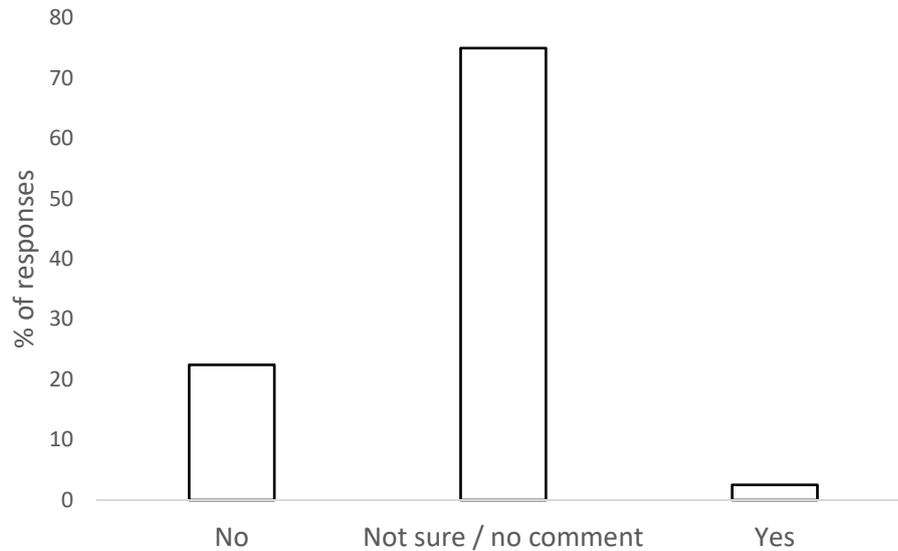


Figure 22: Bar graph showing the responses to the question: *“Do you have plans to use your licence for your retirement?”* (n=49).

When asked what the reasons were for being for or against the use of licences in retirement 19 respondents were against the idea and 8 were for it. Those that were against the idea of using licences in retirement stated that things such as:

- *“A licence should be actively used by the person that holds it”*
- *“A licence should not have any monetary value”*
- *“Sitting on a licence means that newcomers are excluded from joining the fishery”*

Many that were against renting licences noted that the Wash fishery is / will soon suffer from a lack of new, younger fishers and the fleet is starting to get old particularly when looking at vessel ownership.

Those respondents that were for the renting of licences in retirement stated things like:

- *“If people have invested their lives in the fishery, they should benefit from it at the end of their careers”*
- *“There should be no problem as long as the licence is rented only to local fishermen / fishing families”*

It is noteworthy that the average age of respondents for versus against was 48 and 49 years old respectively so those for the use of licences in retirement are not necessarily those that are close to using the licence as such. Similarly, those against the use of licences in retirement were not all young newcomers to the fishery.

Stakeholder recommendations for new byelaw

Uncertainty: Many of the stakeholders that we spoke to felt that the new byelaw brings too much uncertainty into the Wash fishing operations. This in turn will limit operations by making it hard to plan and finance fishing businesses (e.g. business loans etc). Because of this

uncertainty, many suggested having a rolling period that is longer than a year (e.g. every 5-10 years) – but many favoured just rolling the current WFO over into another 30 year agreement. Many are worried that an annually rolling byelaw would give the Eastern IFCA enough control to shut down the fishery without much warning jeopardizing operations from one day to the next. There is also concern that Eastern IFCA will not be able to give fishers any legal guarantee about future fishing opportunities.

This idea of uncertainty highlights potential misunderstanding / misconception that the Wash fishery stakeholders regarding the new Byelaw that will replace the WFO. The fishery is managed 'annually' to reflect the changes in stock level and location – this is how the fishery operates and the byelaw will not change this status quo. The licencing of the fishery will be reflected in policy and will be reviewed every six years and not changed annually (i.e., the number of licences will not be changed year to year depending on stock size). (See Appendix 3 for full anonymised responses regarding worries and the upcoming byelaw)

Licence / permit numbers: When it came to discussions around the number of permits, most were worried that Eastern IFCA may start issuing more fishing opportunities than the shellfish stocks can handle. An alternate fear exists around the issuance of more opportunities whilst reducing individuals TACs which in turn would reduce profit margins for fishing operations (i.e. more fishers but less catch per vessel). Many believe that there are already too many vessels in the Wash fishery and any more will complicate future sustainability and management.

Governance: Many noted concern that the new byelaw would leave the fisheries stakeholders with no say in the operations in the Wash and give full control to Eastern IFCA. Many also noted concern regarding large versus small operators saying that the new byelaw system would easily favour operations that bring in more revenue because if more stringent measures are put in place, Eastern IFCA will weigh the larger operations with more importance than the smaller ones. For this reason, many noted that they felt licences should be owned by individuals and must be fished actively. They also noted processors should not be able to own licences. A general fear is that the local processors will end up monopolising the fishery under the new byelaw).

Compliance: Many questioned how the byelaw will impact fairness in the fishery. Such comments related to the renting of licences and the fact that those that have historically acted in accordance with all Eastern IFCA rulings have come out worse for it because fraudulent licence activity has meant over time the Eastern IFCA has given weight to those renting licences (as they have shown more historical activity in the Wash).

Sustainability: Some stakeholders noted that if the number of fishing operations increases without appropriate management measures, it is likely that some stocks will start to be overexploited. This was commonly a comment related to the whelk fishery (and this is supported by our sustainability analysis). For this reason, some stakeholders suggested that as the new byelaw comes in, the Eastern IFCA should think about less intensive fishing practices to help ensure the future viability of the stocks.

Below we summarise recommendations made by the Wash stakeholders regarding the new byelaw. These are not presented in any order of priority.

Permits & ownership

- Permits should only be given to those that have worked in the fishery over the previous 5 years or more. No newcomers should be allowed to receive a permit without first showing a commitment to the fishery.
- Permits should not be given to non-local fishermen or companies.
- Permits should be “owned” by people not vessels.
- No one should be able to “own” more than one permit.
- Processors should not be able to hold permits.
- No one should be able to rent a permit – if an individual is not actively fishing a permit, then that permit should be returned to a common pool for reallocation.
- The waiting list should not be got rid of and should carry over into the new permitting system so that those that have been patient are not back to square one in the new system.
- The new system should not be an annual rolling system – fishers need more reassurance of longer-term fishing opportunities.

Sustainability

- Rules with the new permits should favour more selective fishing practices and higher market prices instead of constant fishing and lower prices.
- Minimum landing size of cockles should be increased.
- The blow-out method of fishing needs to be questioned and phased out as it is not favourable for cockle recruitment over the long term.

Other

- Any fraudulent uses of permits should face disciplinary action (e.g. exclusion from the fishery for a period of time).
- Good behaviour (following Eastern IFCA rules) should be rewarded.
- There must be legal protections provided to fishermen as part of the new permitting system.
- New byelaw should involve a council of representatives, including individuals from the local fisheries.
- Annual fees associated with the new byelaw should be tailored so they do not price smaller operators out of the fishery (maybe weighted based on activity and historic earnings?).

KI responses quantitative analyses

This section simply visualises the questions from the KI interviews that had quantitative answers. This helps us understand more about the working population of those in each fishery and some simple (average) economics of their operations.

Cockle

The cockle fleet is the largest of the fisheries analysed in the Wash and thus had the most KI interview responses. Most individuals in the fleet were 40 to 60 years old. Roughly half of the individuals have a licence with those individuals stating it was relatively easy to get a licence. However, many individuals without licences have been waiting for 10+ years on the waitlist. Most individuals work for ltd. companies. Half of the individuals interviewed were working within a family business. Seven out of the 38 individuals work other jobs throughout the year (Figure 23).

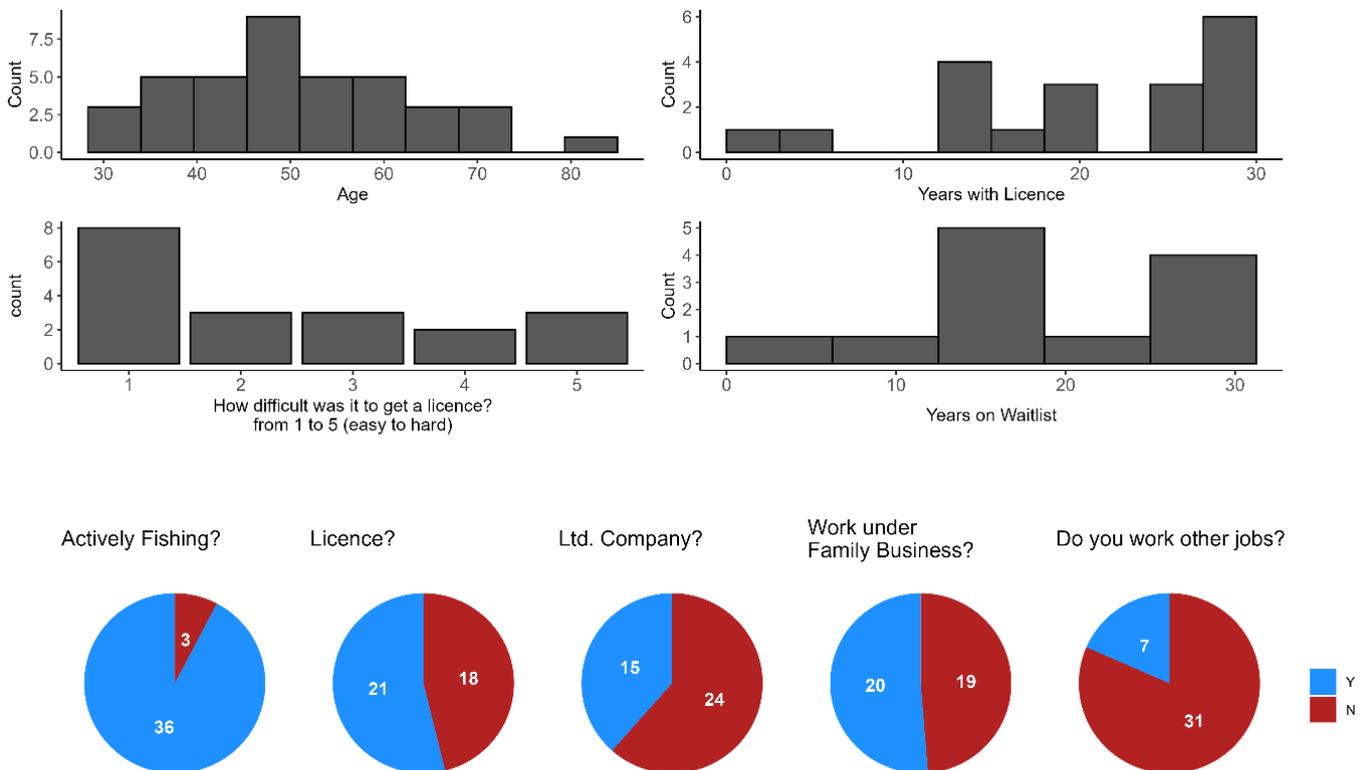


Figure 23: Results from KI Interview for individuals fishing cockle within the Wash. Distributions are shown for: age, years with a licence, how difficult it was to get a licence (scale of 1-5), and years on the waitlist for those individuals without a licence. Pie charts identify which individuals are actively fishing, those currently with a licence, those who are part of a ltd. company, those who work under a family business, and individuals that work other jobs.

The price paid for vessels within the cockle fleet varies widely, though most vessels were under £250,000. Vessels are split between older (pre 2000s) and newer (post 2000s) vessels. A large proportion of the vessels in the cockle fleet were built around 2000 (Figure 24).

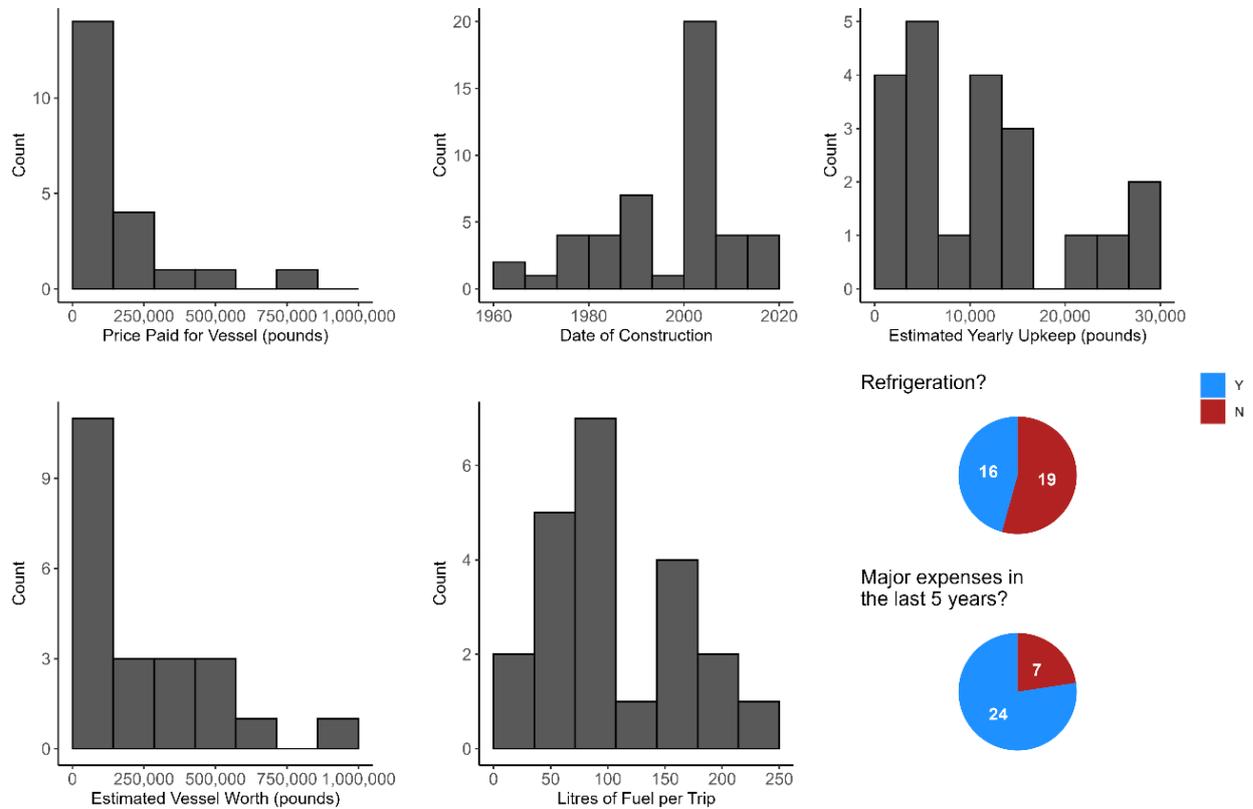


Figure 24: Vessel information from KI Interviews for individuals fishing cockle within the Wash.

Most cockle vessels hire two additional crew members (plus the skipper). For many of the vessels, these additional crew members are family. Almost all vessels operate under crew pay as a share of the landings, 3 of the 45 vessels operate under a fixed rate (Figure 25).

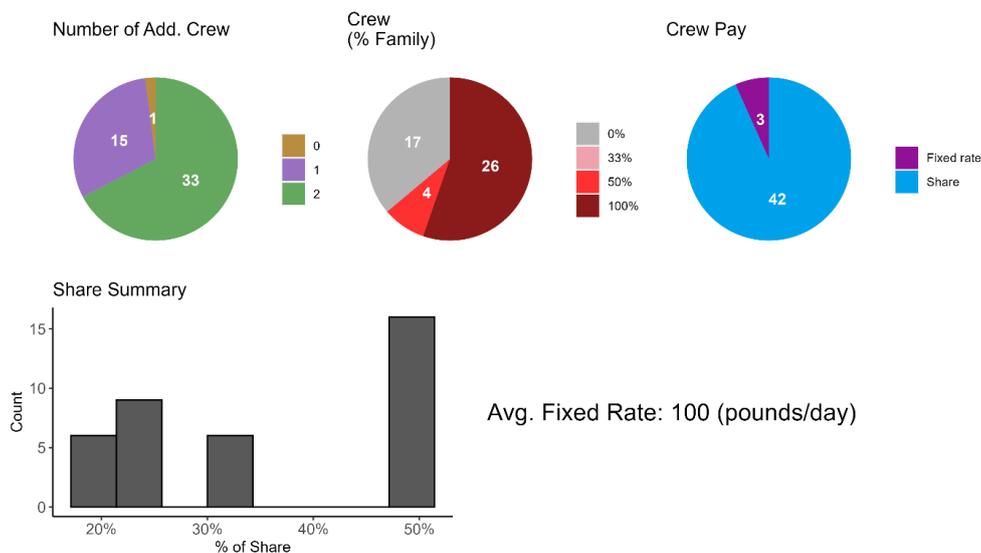


Figure 25: Crew information from KI Interviews for individuals fishing cockle within the Wash.

Whelk

Individuals in the whelk fleet tend to be slightly younger than those in the cockle fleet (30 to 50 versus 40 to 60). All individuals within the whelk fleet were actively fishing whelk at the time of these interviews. Most individuals interviewed that fish whelk did not have a licence in the Wash Fishery (were not fishing cockle). Only one individual out of the eight interviewed worked other jobs (Figure 26).

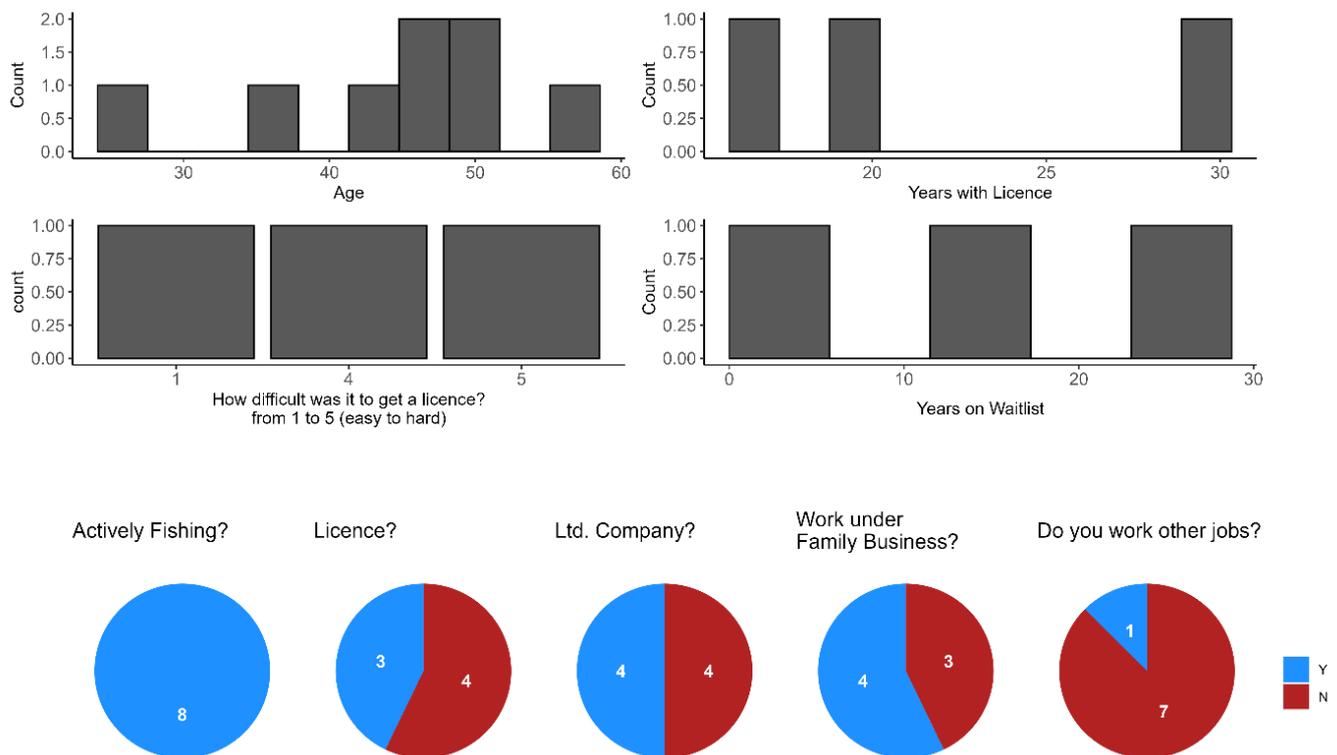


Figure 26: Results from KI Interview for individuals fishing whelk within the Wash. Distributions are shown for: age, years with a licence, how difficult it was to get a licence (scale of 1-5), and years on the waitlist for those individuals without a licence. Pie charts identify which individuals are actively fishing, those currently with a licence, those who are part of a ltd. company, those who work under a family business, and individuals that work other jobs.

Like cockle, most vessels targeting whelk had two crew members (plus the skipper). Again, many crew members were also family members. All vessels for which there were interviews operated on a crew share rather than a fixed rate (Figure 27).

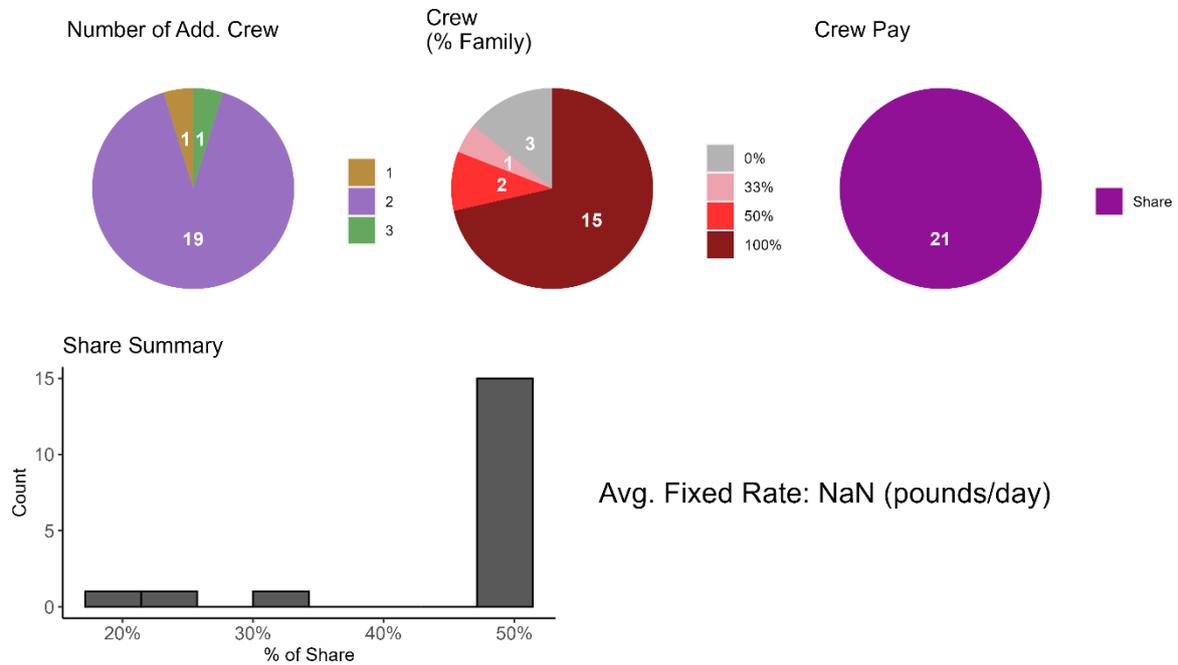


Figure 27: Crew information from KI Interviews for individuals fishing whelk within the Wash.

Shrimp

The distribution of ages within the shrimp fleet was like cockle (40 to 60 years old). Licence responses were also similar with about half of the individuals having licences (and fishing cockle) while the other half did not (Figure 28).

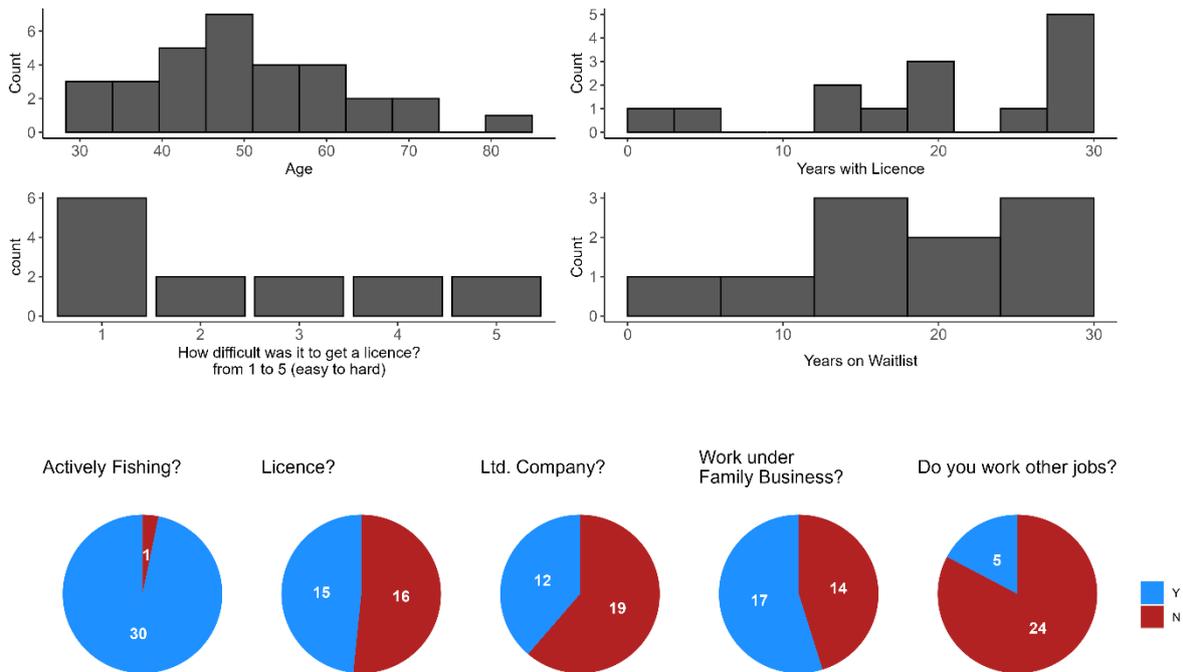


Figure 28: Results from KI Interview for individuals fishing shrimp within the Wash. Distributions are shown for: age, years with a licence, how difficult it was to get a licence (scale of 1-5), and years on the waitlist for those individuals without a licence. Pie charts identify which individuals are actively fishing, those currently with a licence, those who are part of a ltd. company, those who work under a family business, and individuals that work other jobs.

Shrimp vessels tended to have 2 crew members (plus the skipper), though some vessels had only one additional crew member. Shrimp vessels were also less likely to be crewed by all family members. Again, like whelk, all shrimp vessels operated under a crew share pay structure (Figure 29).

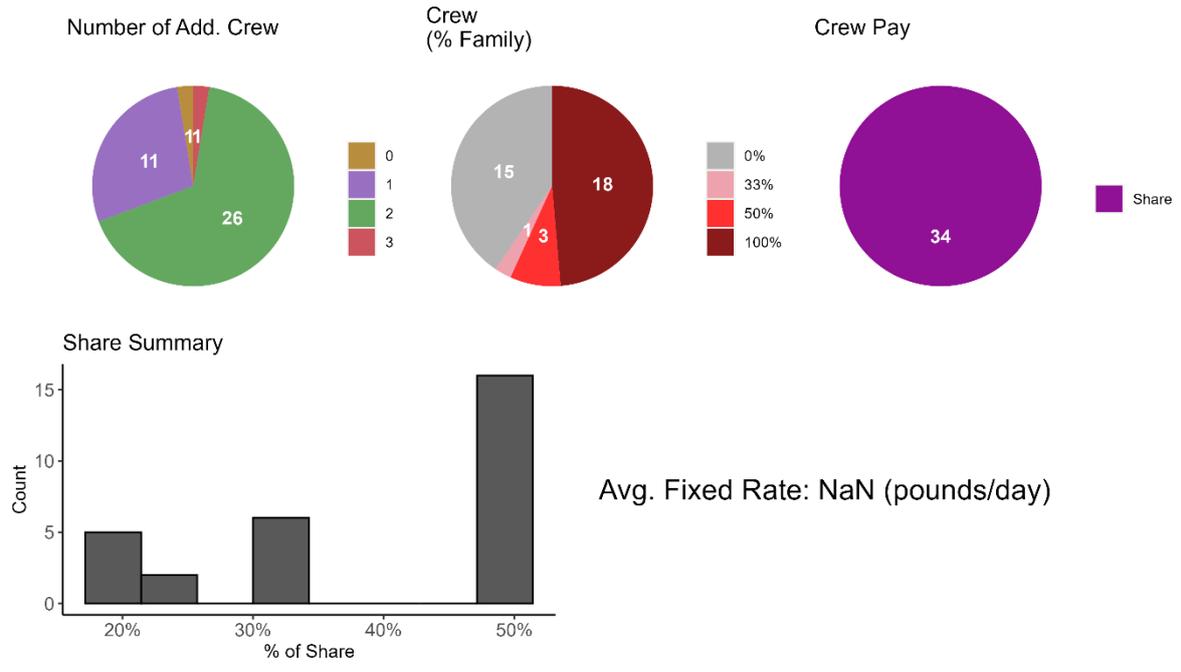


Figure 29: Crew information from KI Interviews for individuals fishing shrimp within the Wash.

Economic Assessment

Much of the following section has been anonymised for privacy reasons. This section aims to highlight the economics / finances within the Wash to illustrate things like diversity in profit margins, salaries, crew shares and similar metrics.

Individuals with more vessels tended to catch a higher proportion of cockle landings per year. Overall, the proportion of cockle landings per owner does not vary much from year to year, with the major owners catching a far larger proportion of the landings relative to owners with only one vessel (**Figure 30**)

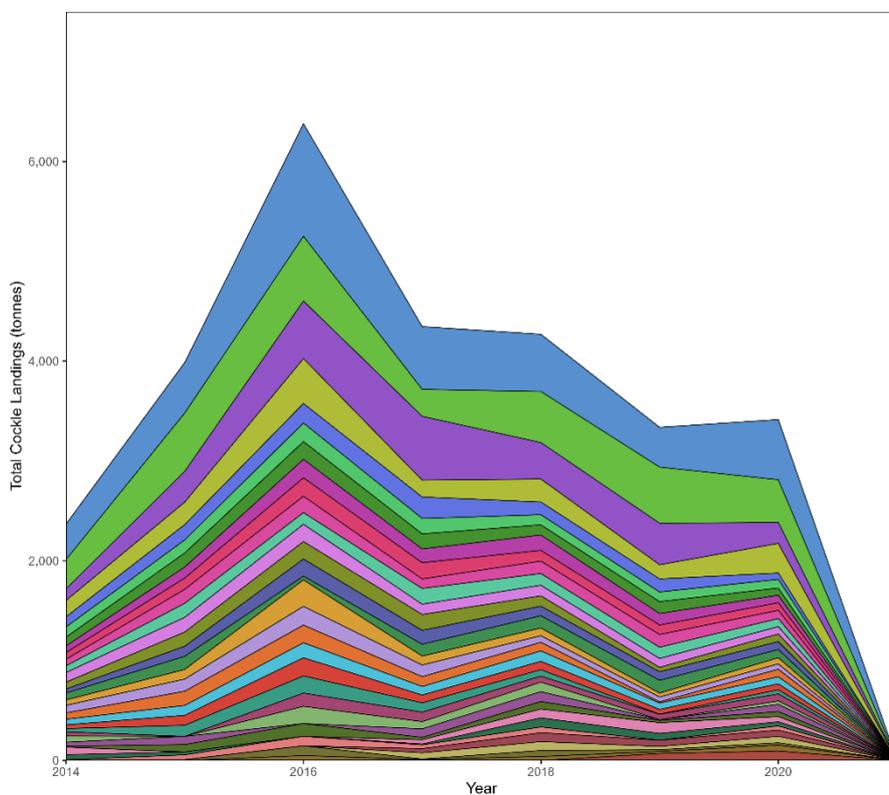


Figure 30: Cockle landings per year where colours indicate the landings per vessel owner. Note: names of individuals removed to protect ID in Figure 30.

Overall, individual vessel owners appear to take home higher yearly salaries than nominated representatives (Figure 31). This is unsurprising as nominated representatives likely need to share profits with a vessel owner, hence taking a lower overall salary.

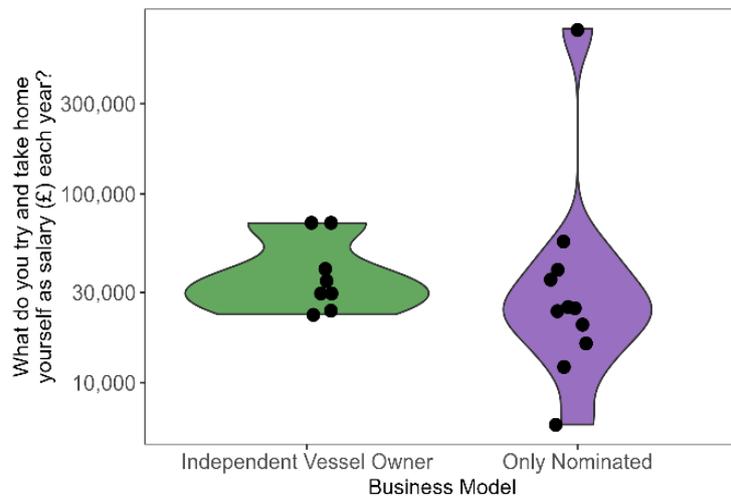


Figure 31: Relative profits between various business models within the Wash Cockle fishery. Data was collected from KI interviews. Distributions were drawn for groups with more than one individual.

Unlike cockle, the proportion of whelk landings per vessel owner varied widely from year to year (Figure 32).

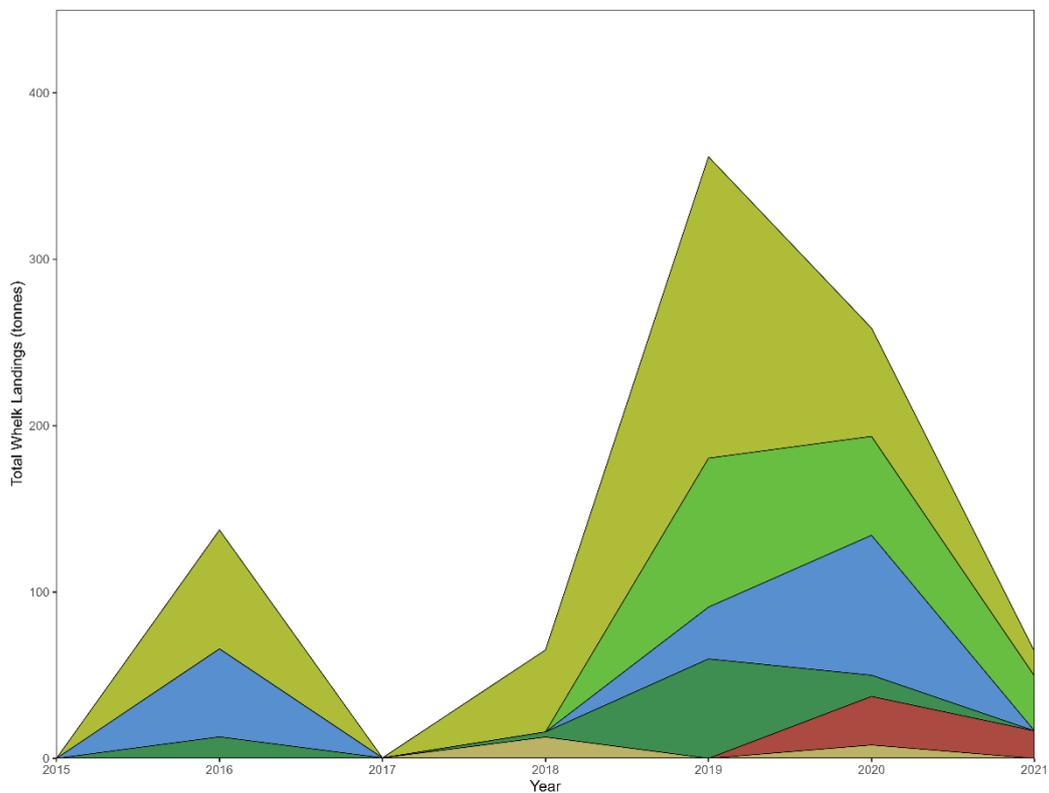


Figure 32: Whelk landings per year where colours indicate the landings per vessel owner. Note: names of individuals removed to protect IDs in Figure 32.

Shrimp landings, as previously stated varied widely from year to year. This is likely in part due to irregular reporting within the Wash shrimp fishery. The proportion of landings per year also varied quite significantly. Owners with a high proportion of the landings from 2015-2018 did not necessarily have the highest proportion of landings from 2019-2021 (Figure 33). Again, this may be due to uneven reporting rather than reflect the current state of the shrimp fishery.

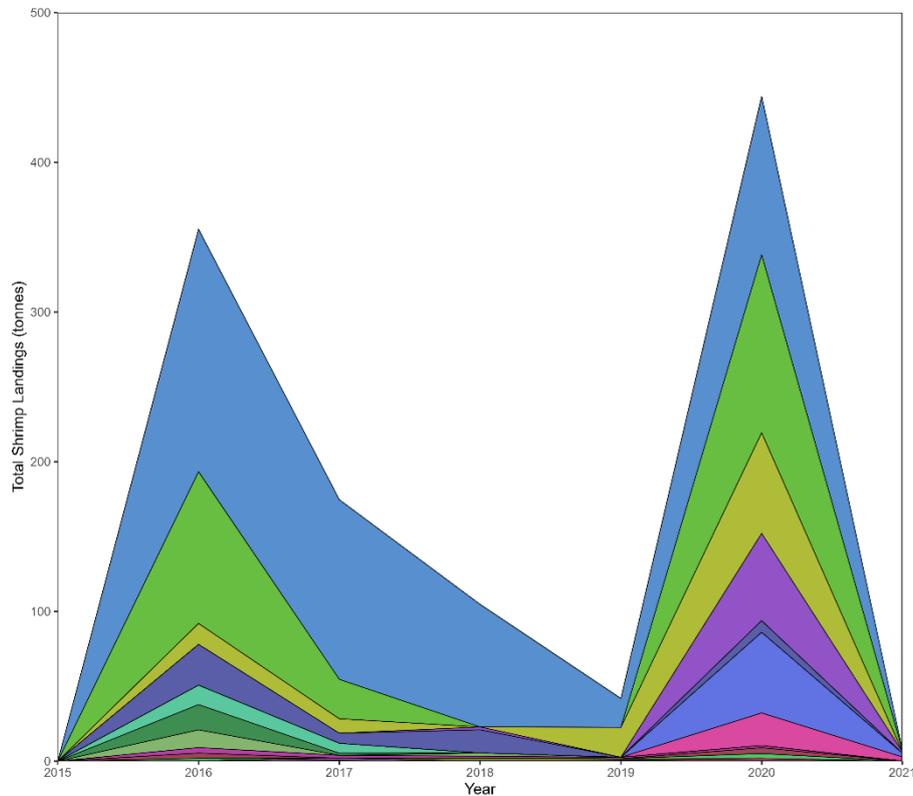


Figure 33: Shrimp landings per year where colours indicate the landings per vessel owner. Note: names of individuals removed to protect IDs in Figure 33.

Overall, vessels that employed a crew share pay structure for the cockle fishery tended to pay the best. This was followed by shrimp vessels with crew share, then whelk vessels with crew share, and finally cockle vessels with a fixed rate (Figure 34). Understandably, vessels that fish fewer days per year paid their crew less per year. Vessels that earned more per year tended to pay their crew better relative to vessels that earned less. The most economic resilient option for a crew member is therefore to work as a crew share fisherman in the cockle fishery with an operator / vessel owner that fishing the maximum number of days possible.

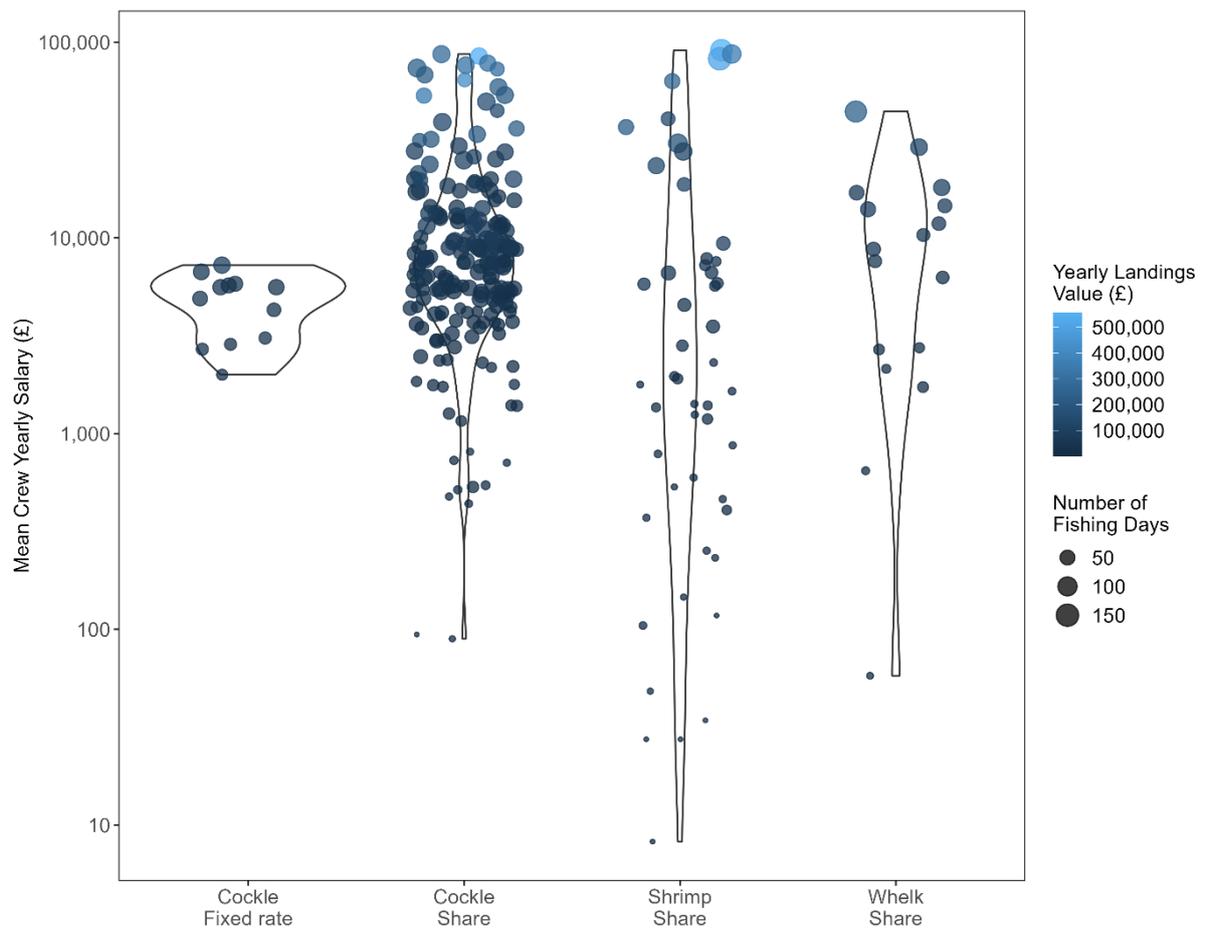


Figure 34: Estimated yearly crew salaries per vessels per year for the major pay structures in the Wash Fishery by stock. Size of the points indicates the number of fishing days per year by a given vessel, while the colour of the points indicates the estimated total yearly landings value for a given vessel.

Overall, vessel owners were estimated to have higher average yearly salaries than crew. The median yearly salary for cockle vessel owners was higher than both the estimated mean fisher salary in the UK (£22,752.58¹) and the UK Living Wage (£16,742.40) (Figure 35). Vessel owners that fished whelk had median salaries that aligned closely with the UK Living Wage while shrimp vessels tended to have lower salaries than both the mean UK fisher salary and UK living wage. Overall, crew members had much lower median salaries than both the mean UK fisher salary and UK living wage. Again, cockle crew member that work on boats with catch shares had the highest overall salaries. It is important to note that both vessel owners and crew members are likely to fish multiple fisheries and as such may have total yearly salaries that are at or far above both the UK Living Wage and mean UK fisher salary.

¹ Based on 3 estimates gleaned from different UK job search websites

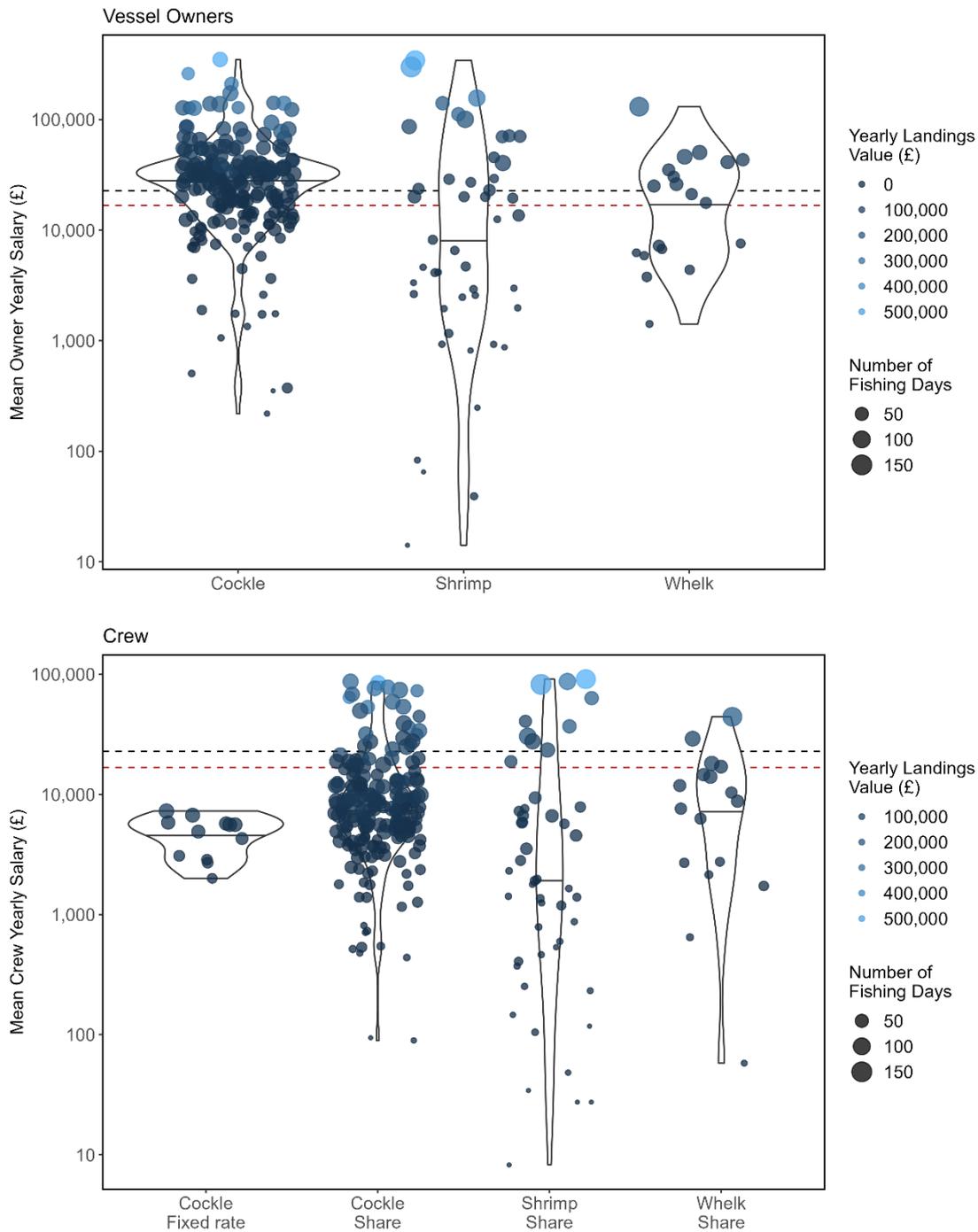


Figure 35: Yearly salary for both vessel owners and crew across all fisheries and all years. Dashed black line represents the mean yearly UK fisher salary (£22,752.58) while the dashed red line represents the UK living wage (£16,742.40). The colour of the points represents the total landings value per vessel owner per year. The size of the circle represents the number of fishing days across all vessels per vessel owner per year.

While it is likely that crew members and vessel owners fish multiple fisheries within the Wash to make a living, some individuals work other jobs in addition to their job as a fisher (Figure 36). We find that those individuals that work additional jobs tend to make lower salaries than individuals that work only as fishers within the Wash. We also find that individuals that are

nominated representatives are the only business model in the Wash where individuals also work other jobs. Whilst a natural conclusion to draw may be that those who have non-fishing income are forced to do so because of poor returns from the fishery, we should not rule out the fishery itself being a secondary source of income to supplement a primary (shore-side) employment in some cases.

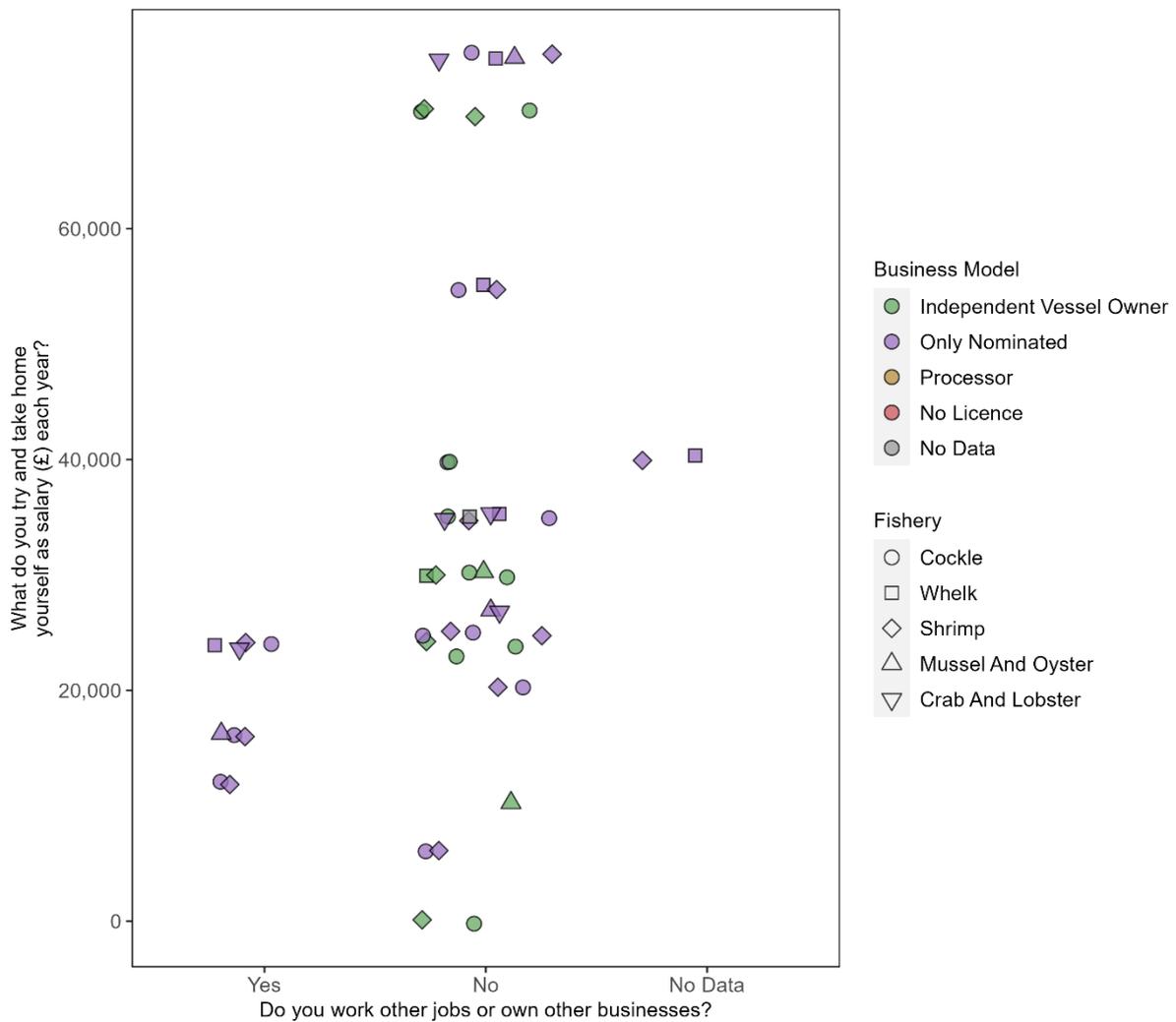


Figure 36: Whether individuals work other jobs versus their estimated yearly salary (from KI interviews). Fisheries are represented by different shapes: Cockle (circle), Whelk (square), Shrimp (diamond), Mussel and Oyster (triangle). Different business models are represented by different colours: independent vessel owner (green), only nominated (purple), processor (gold), no licence (red), no data (grey).

Across all years, cockle vessels operating under a crew share pay structure employed the most crew members (Figure 37). Since the number of crew aboard these vessels varied little per target stock, it makes sense that the largest fleet (cockle) also employs the most individuals. On average, crew share cockle vessels tend to provide the best daily crew wage amongst all other fleet types. However, as previously stated, landings of shrimp are highly variable and in 2020, the shrimp fleet had the highest daily crew pay on average across all years and all fleet types.

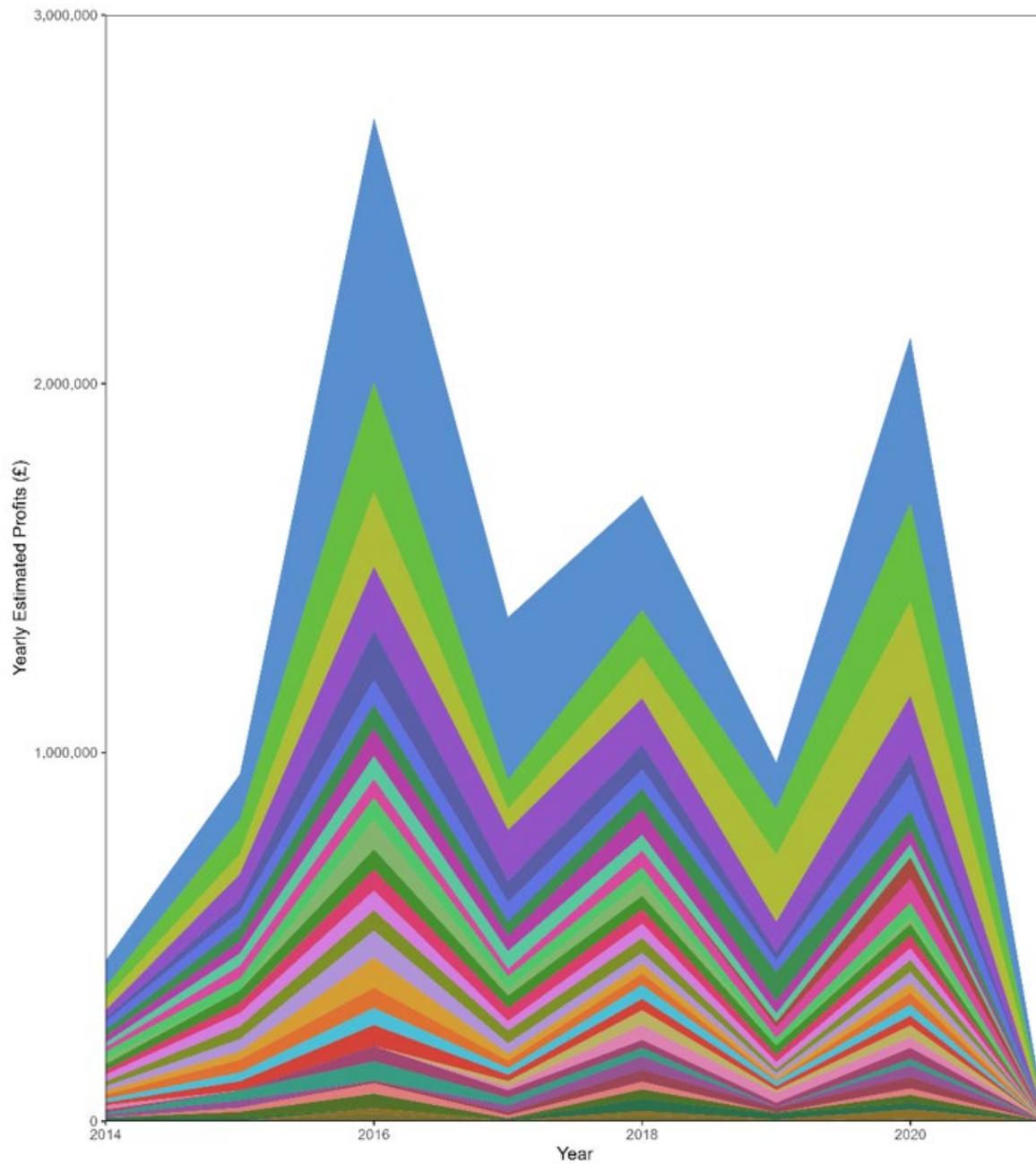


Figure 38: Total profits per owner per year across cockle, whelk, and shrimp fisheries. Colours represent owners associated with known vessels in the Wash. Note: names of individuals removed to protect IDs in Figure 38.

Within the Wash Fishery, the four major players are generating far higher profits relative to all other owners in the fishery (

Figure 39). However, crew costs and fuel costs are also higher for these individuals. Overall, all vessel owners within the Wash tend to have similar profits to costs ratios. Thus, while the major players may make more profits, they are also contributing to a larger proportion of the jobs within the fishery and to the overall salaries of the employed crew.

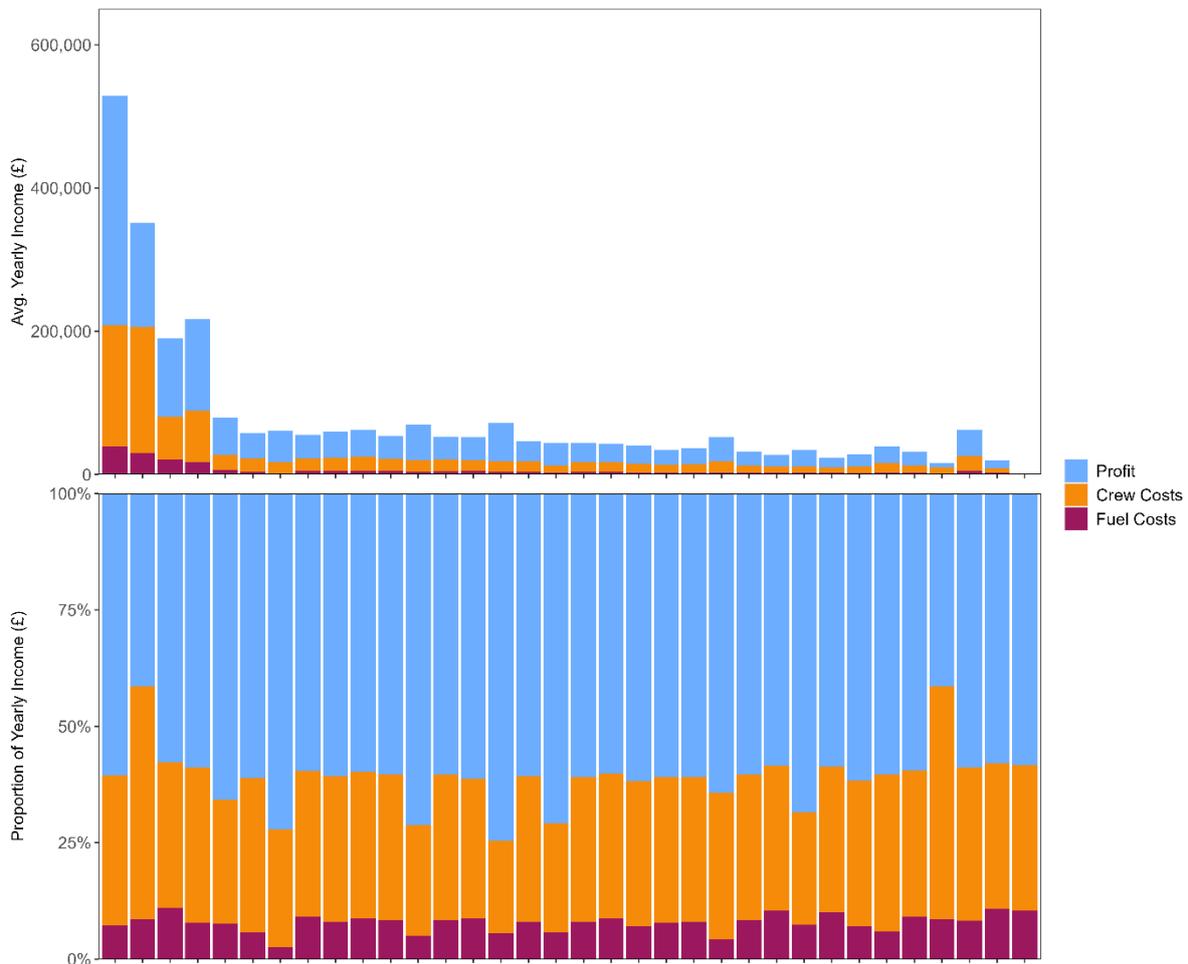


Figure 39: Average yearly income of vessel owners within the Wash Fishery. Top plot shows the absolute values of profits, crew costs, and fuel costs. While the bottom plot shows the relative proportion each category represents in terms of total income. Colours represent the distribution of income into: profits, crew costs, and fuel costs. Note: names of each fisher have been removed as this data was collected from the KI interviews.

The cockle fishery is the primary fishery in the Wash. Most vessel owners make 80-100% of their profits from the cockle fishery alone. The shrimp and whelk fisheries are less commonly fished and as such make up a lower proportion of the total profits for all vessel owners. Across all the data provided, no vessel owner makes over 50% of their profits from either shrimp or whelk alone. Processors and some unknown business models (individuals with multiple vessels) tend to have the lowest proportion of profits from cockle and the highest proportion of profits from shrimp (and occasionally whelk). These individuals also have some of the highest overall profits, suggesting that the diversification of fishing across multiple stocks may help increase their overall profits. Such diversification, however, should be considered in light of the sustainability results of this report that highlight whelk will likely not stand additional efforts (e.g. more individuals seeking to diversify into whelk) and shrimp is stable but under evaluation by the EIFCA regarding a vessel cap.

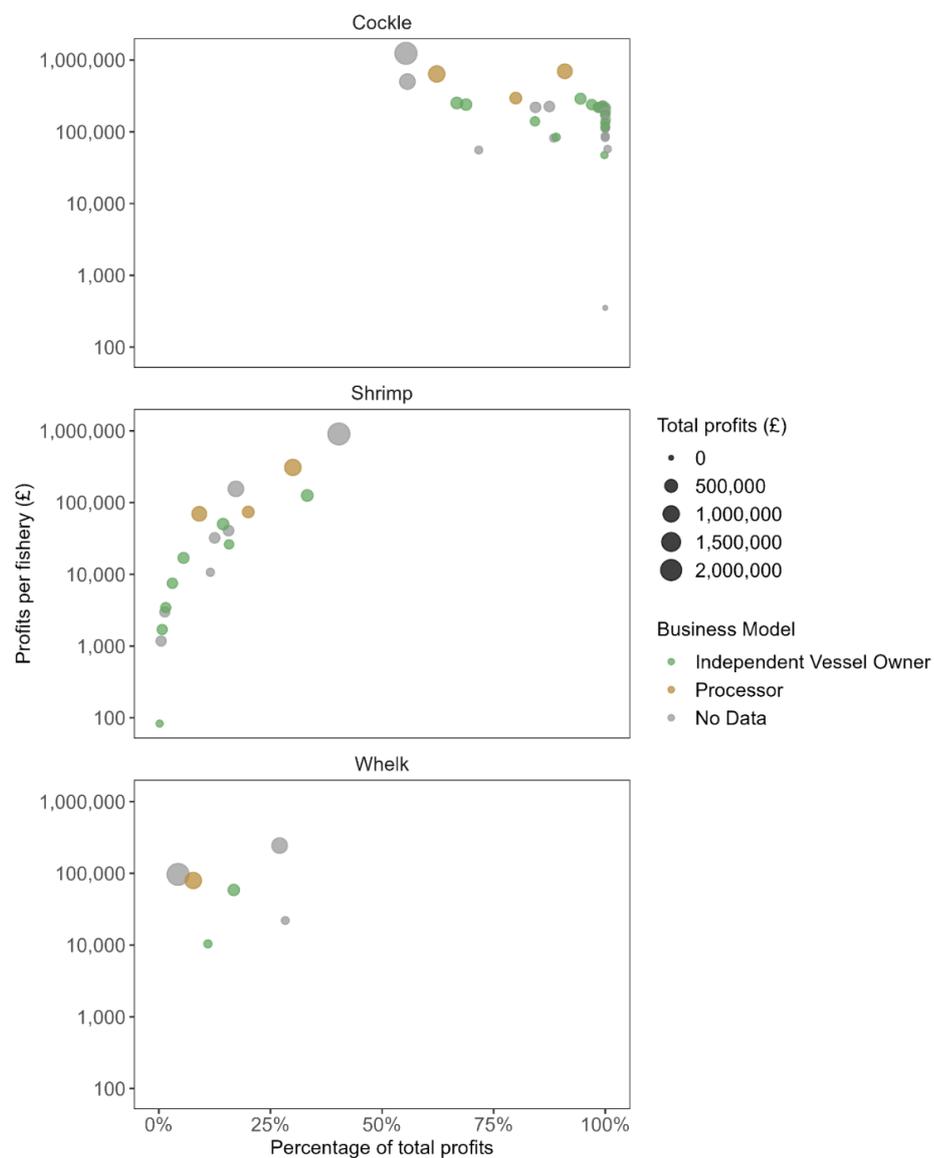


Figure 40: The mean percentage of total profits per vessel owner derived from each fishery versus the profits from each fishery. Size represents the mean total profits per vessel owner. Colour represents different business models: independent vessel owner (green), processor (gold), and no data (grey).

It is noteworthy that individuals that fished as part of a larger company earned larger yearly incomes (on average) (Figure 41). On the one hand this supports the idea that working for a large enterprise maximised return / individual profit. On the other it highlights some of the fears of certain stakeholders that it is difficult for smaller operations (individuals) to survive / compete with larger businesses. For example, one KI noted *“There needs to be a regulating order not a permit. There cannot be a single year permit. A single small fishing family can't survive on that uncertainty. Big companies will push small families out”* – when asked if they had any last thoughts.

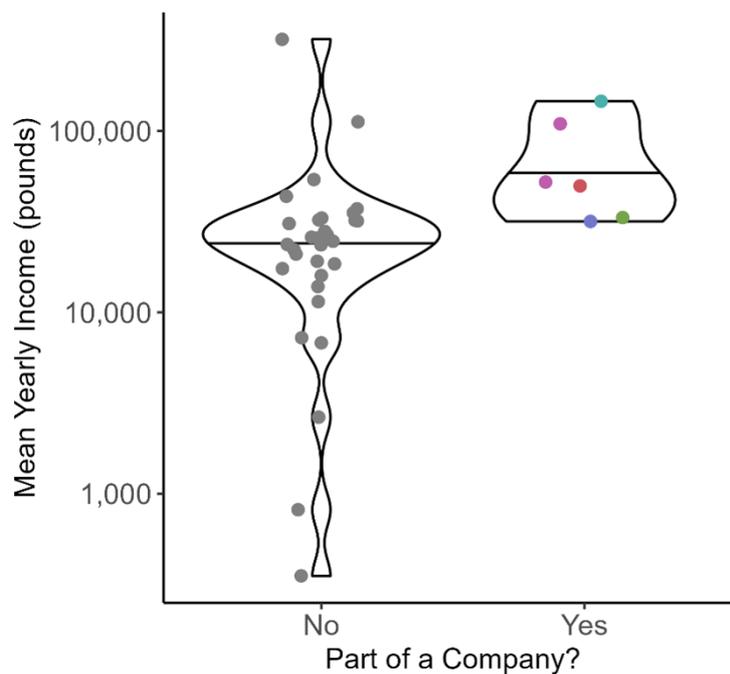


Figure 41: Violin plot showing the distribution of annual salaries of individual operators versus those operating as or under limited companies. Coloured dots indicate different Ltd companies in the wash (including processors). Note: The legend has been removed from this plot as data on company names and salary ranges were collected during the KI surveys.

Individuals within the Wash tend to fish multiple fisheries over the course of the year. On average, most fishers (based on KI interviews) fish at least two different fisheries, the most common being cockle and shrimp. Fishers that fish more than two fisheries often still fish cockle and shrimp as their primary fisheries while also fishing either whelk or mussels and oysters.

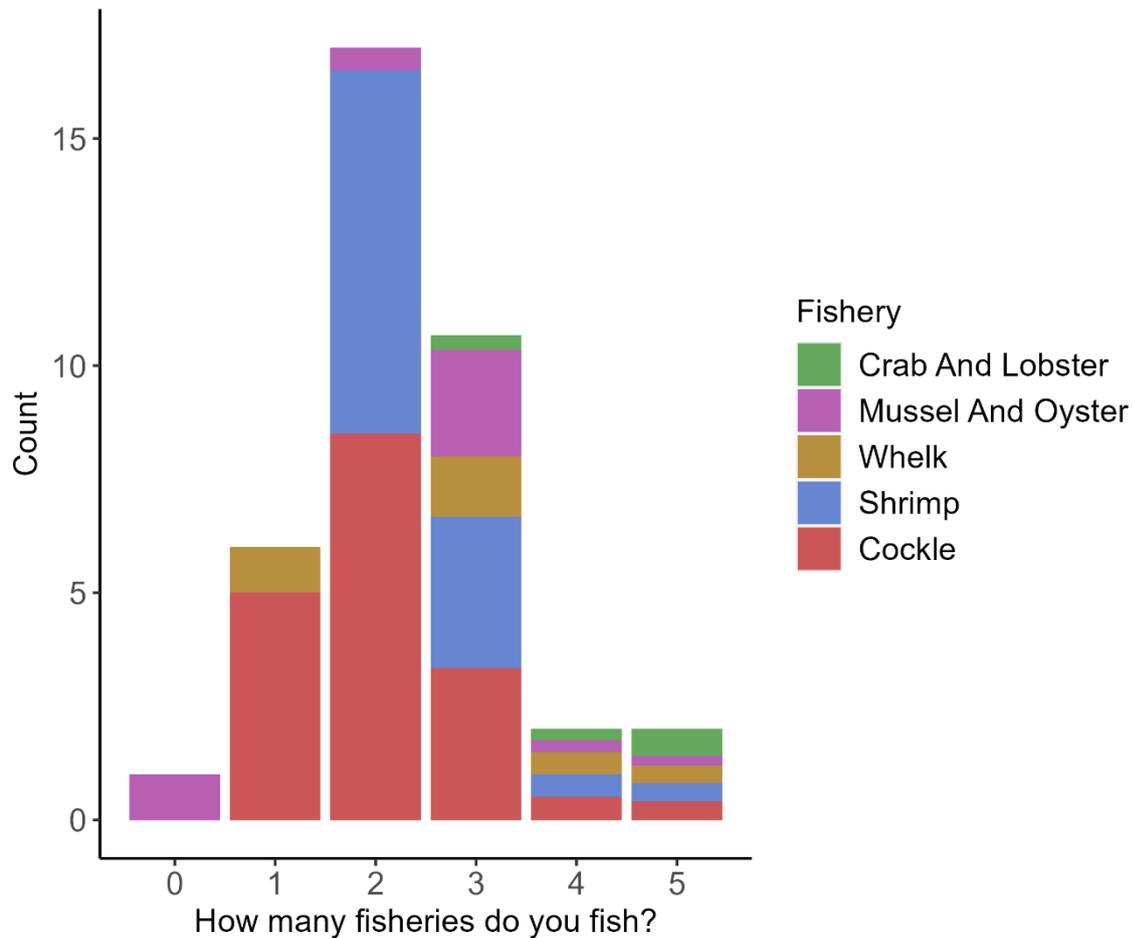


Figure 42 : Plot showing the number of fisheries individuals within the wash fish. Counts for individuals are then coloured based on the fisheries they fish: crab and lobster (green), mussel and oyster (purple), whelk (gold), shrimp (blue), and whelk (red).

Fishing strategies (e.g. fish fast without specific size selectivity, fish slow with size selectivity, etc) (based on KI interviews) appear to lead to highly variable outcomes in annual salaries (Figure 43). Across all five fisheries mentioned within each interview most respondents paid themselves a salary of between £20,000 and £40,000 per year. Most respondents considered their fishing practices to be selective. The diversity of salaries within the “selective” fisheries, however, was broad suggesting perhaps that fishing strategies may not indicate monetary success in the fishery, or that individuals are poor judges of their own strategies or selectivity. It should, however, be noted that all the higher-end salaries (£ > 40,000) were associated with “selective” practices. This may well indicate that spending more time fishing “better” / more selectively is a more lucrative approach to fishing. Whether this is a more sustainable approach is uncertain based on comments around discarded cockles not having time to re-bury themselves before tides – in selective fishing cases, it is likely the case there are more, smaller cockles laid back onto the grounds / discarded during operations.

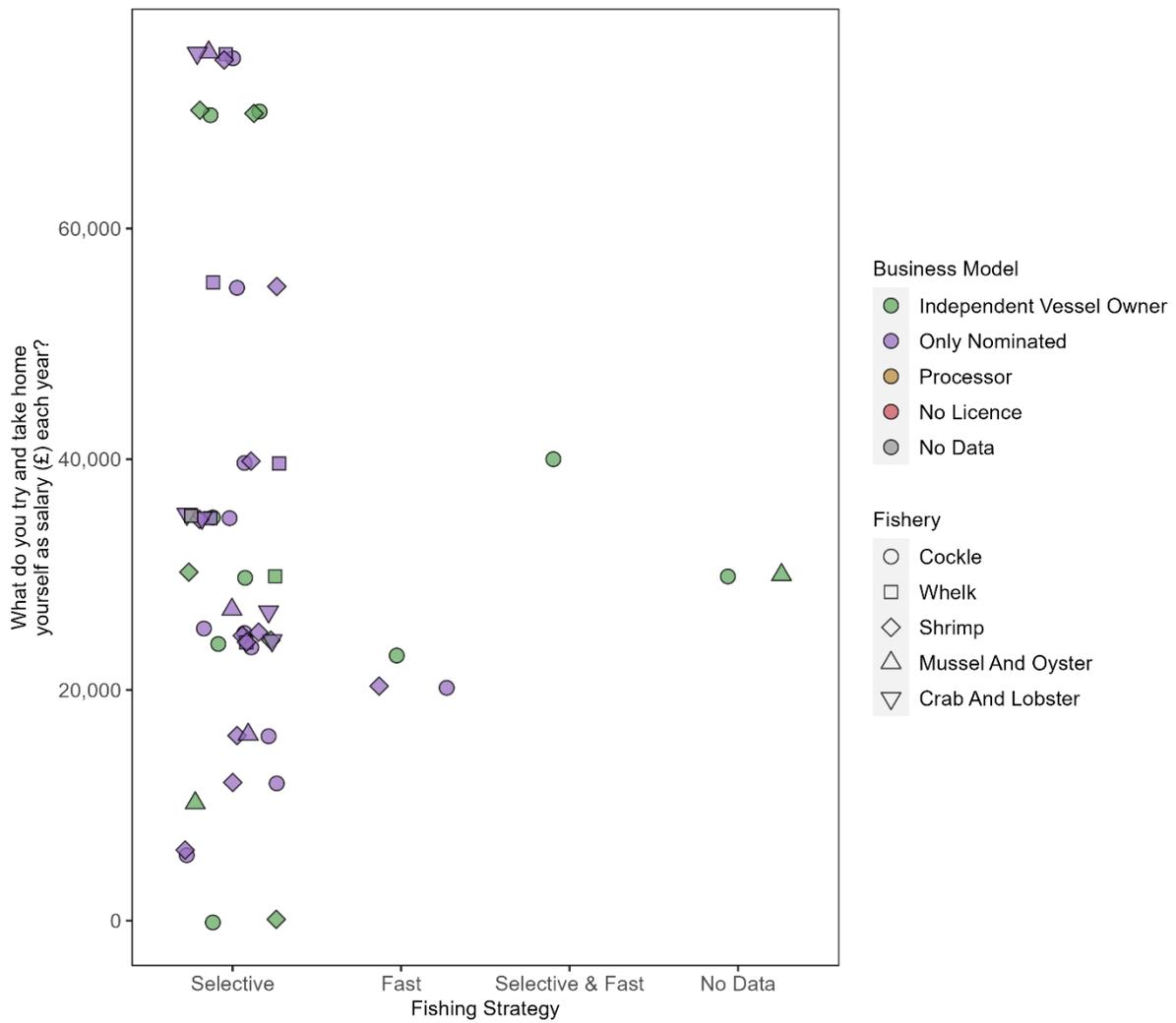


Figure 43: Relationship between fishing strategy and yearly salary estimates as derived from KI interviews. Fisheries are represented by different shapes: Cockle (circle), Whelk (square), Shrimp (diamond), Mussel and Oyster (triangle). Different business models are represented by different colors: independent vessel owner (green), only nominated (purple), processor (gold), no licence (red), no data (grey).

MFE responses to questions posed by the Eastern IFCA

- **Is the hand-work cockle fishery economically viable for those who work in it? Are the returns they are getting, supporting a reasonable income?**

The results presented above highlight that the current management practices are sufficient to maintain the ecological sustainability of the Wash cockle fishery (assuming all else is equal). Based on the calculations of profits and responses regarding annual salaries in the fishery, we believe that the fishery is economically viable for vessel owners. We do, however, feel that it is important to carefully consider the idea of a “reasonable income”. Our analyses highlight that many vessel owners fishing cockle make over the living wage but crew are not as well remunerated. Our analyses do not consider time and effort invested in the fishery which we would assume to be higher for the vessel owners than crew. One could argue that the differences in salary between the vessel owners and the crew are therefore to be expected. Whether or not the salary ranges are “reasonable” is not for us to comment as different stakeholders will have different costs / standards of living that they aspire to.

- **Do some business models have more resilience than others?**

Larger operations (vessel owners with multiple vessels) likely have the most resilience followed by vessel owners that fish multiple fisheries. Almost all individuals that only fish a singular fishery choose to fish cockle, likely due to the relative stability of the fishery in its current state. It is not the case that one fishery can substitute another and individuals that do not fish the cockle fishery are generally far less resilient (economically) than those who primarily fish cockle and “supplement” their earnings by working other fisheries. It is difficult to dive into the idea of resilience further without proposing future scenarios to understand a pressure that would test the resilience of a model. For example, if the whelk fishery collapsed, many of the operations would be able to maintain economic viability because 1) few people fish the whelk 2) those individuals that make the most profits off whelk are vessel owners with multiple vessels and 3) many that fish the whelks also rely on the more lucrative cockle fishery.

- **What is the optimum number of licences?**

Based on our analyses we believe the current number of licences is appropriate for the sustainability of the fishery. Fewer licences would limit business operations / livelihoods for many stakeholders and more licences may put too much pressure on the cockle fishery moving forward. However, we believe that in a well-managed fishery dynamic licencing is a possibility. For example, if the cockle fishery is performing consistently well, there would appear to be no reason to limit the extraction from the fishery based on previous (lower) biomass years. Increasing the capacity of the fishery could be undertaken either by an increase in licences or an increase in TACs distributed among the same number of vessels. It is important now to discuss the reverse. If the cockle fishery performed consistently badly, it is tempting to say that a reduction in the number of licences should be mobilised to reduce pressure on the fishery. Whilst that may appear to be a good idea for the recovery of stocks, it is not logistically viable for many stakeholders (particularly impacted crew and single vessel owners). We do not believe it is reasonable to ask fishers to plan businesses with the potential of losing licences over short time periods (year-to-year). If the cockle fishery did show signs of over exploitation, we would suggest that it is a better solution to dynamically adjust

TACs – just as Eastern IFCA do at present and only consider changes in the number of licences over much longer time scales that would allow stakeholders to react in good time and plan for such changes.

- **Is there a better way to distribute licences to enhance resilience and / or which would benefit the sustainability of interconnected fisheries (e.g. there are far fewer whelk permits than cockle licences, do these need to be balanced to spread opportunity and reduce reliance on any particular one?).**

We believe that this question should be clarified to cover both “enhancing ecological resilience”, “enhancing economic resilience” and “enhancing equality”. In terms of ecological resilience and the cockle fishery, the current status quo appears to work fine, and the current distribution of permits works. This does not mean that the economic resilience is the same. For those that rely primarily on the cockle fishery for their income (many stakeholders) then the current licence distribution would appear to work well economically. However, if we consider equality and the large range of salaries and profit margins, our response now changes. In some cases, there are individuals that own multiple vessels and hold multiple licences. This could easily be argued (and is argued by many stakeholders) as unfair, largely because all it does is exclude others from making a living from the Wash and provide disproportionate profits to those holding multiple licences. However, it is not a simple case of recommending spreading these licences, so they are all individually owned. First it will be important for the Eastern IFCA to understand who would potentially take up free licences asking questions like – are they suitably qualified, will they follow the rules in the new byelaw etc. It is also noteworthy that larger fishing operations generally pay their crew more than smaller operations – thus few larger operations could potentially be seen to “share the wealth” that they have when looking at their profits, better than smaller operations. However, it should be noted that the dominance of larger operations within the Wash fishery would likely lead to more nominated representatives underneath these large operations and fewer individual vessel owners. While large organizations may be better at distributing wealth at the crew level salary, they may also restrict the growth of new individual vessel owners—a key business model in the Wash that contains higher overall salaries. Redistributing opportunity by increasing permits in (for example) the whelk fishery will unlikely help the resilience of operations considering the whelk fishery does not appear to be very sustainable at present. A redistribution from cockle to whelk would likely only serve to degrade the whelk fishery further, reducing profits of those already fishing whelk (who generally make less than the cockle fishers).

- **What would happen if we removed one fishery? Could fishers still make a living – at what level would this living be?**

Removal of the cockle fishery would shut down most operations in the Wash.

Removal of the whelk or shrimp would have a much lesser impact (a shrimp closure would most likely be more impactful overall than a whelk closure).

- **If we reduce licenses what likely happens? – more reliance on which fisheries?**

Reducing the number of licenses may have little ecological impact if TACs are increased to levels like previous years. Reducing licences, however, would likely mean that many operations would close because the other fisheries are unlikely profitable enough to sustain increased effort. This is particularly true for individual vessel owners that may lack the infrastructure provided by a larger organization.

- **What is the potential impact of / observations about a dredge fishery – noting the key factors below:**
 - **Cockle dredge fisheries have a higher daily quota (4 tonnes) and are much shorter fisheries.**
 - **Not all the fleet is capable of participating and equipment is expensive – most if not all of the existing equipment hasn't been used since 2008.**
 - **Uncertainty around environmental and sustainability impacts of the method.**

We believe it would not be prudent to revert to a dredge fishery based on our knowledge of Wash fishery sustainability and KI interviews. However, we must caveat this with the fact that we have not seen catch time series and economic data before 2015. Since the cockle fishery seems to be in good standing ecologically and economically, we would suggest not changing fishing method unless it was to reduce the use of blow-out which many believe is causing unnecessary mortality in the cockle fishery (although we have no data to support this). It is also important to consider the economic consequences of a dredge fishery which is open for fewer fishing days. This may culminate in reduced workdays which will have a likely knock-on effect of reduce overall earnings for crew members and potentially for nominated representatives.

- **Is it the case that multiple vessel owners / processors work across all fisheries whilst independent fishermen more commonly work only on single fisheries?**

Yes, multiple vessel owners and processors generally work across all fisheries. However, the story is mixed for independent vessel owners. Very few only operate in one fishery with most operating in at least two (cockle and shrimp primarily or cockle and whelk)

- **Are Processors more resilient than independent fishermen?**

In general, we think it is safe to say that processors are more resilient because they often work across many different fisheries and have redundancy built into their business models by default (multiple vessels, crew / employees etc.). It is also likely that they have great financial reserves to be able to change fishing behaviors compared to independent vessel owners, although we do not have data to support this assumption.

- **Fishers say that their fisheries are in decline, but can we say anything about this from the economic data? Are they justified in their responses?**

In general, those that earn less (nominated individuals) perceive the fisheries as performing more poorly when compared to those that earn more (independent vessel owners). While this finding may not be indicative of the ecological status of the fishery it should be considered when assessing the current and future distribution of licenses. When large organizations hold the lion's share of the licenses, individual vessel owners may find it too competitive of an environment to remain economically viable. As previously stated, a loss of individual vessel owners removes a key business model within the Wash, substituting these positions with a role (nominated representative) that pays less and where individuals feel dissatisfied.

Management - status and future recommendations

Below we lay out a brief description of current management measures used across the cockle, whelk and shrimp fisheries and then add our recommendations on measures that the Eastern IFCA should consider to best maintain ecological sustainability of the fishery (and the long-term economic viability of the fisheries assuming responsible levels of effort).

			Licence requirement for fishery	Pre-season assessment	Total Allowable Catch	Vessel / effort cap	Pot limit	Technical measures	Closed Areas
Until 2023	Yes / No / Maybe (+ notes)	Cockle	Y	Y	Yes, based on stock assessment	Y	Na	Y	Based on spatial surveys + previous landings
		Whelk	Permit	N	N	N	500	Y	
		Shrimp	Permit	N	N*	N*	Na	Y	
Post 2023	Yes / No / Maybe (+ notes)	Cockle	Y	Y	Yes, based on pre-season assessment	Same as previous – but could be dynamic-based on pre-season assessment if assessments do well enough	Na	Potential minimum landing size (dynamic – based on recruitment)	
		Whelk	Y	Y	Yes, based on catch (minimum) or pre-season assessment (preferred)	Yes	<500	Minimum landing size maintained at 55mm (but could be dynamic – based on recruitment)	
		Shrimp	Y	Y		Yes	Na	Mesh size, trawl size / vessel size	
<p>* The shrimp fishery has been awarded Marine Stewardship Accreditation and industry led measures are in place to manage the fishery in that context. This includes Harvest Control Rules which will limit effort where needed to ensure stock sustainability. In addition, the accreditation also effectively limits entry to the fishery. None of these are regulatory measures implemented by Eastern IFCA.</p>									

Permit recommendations

- We recommend that the number of licences are not increased in the Wash fishery unless quotas are adjusted accordingly to compensate for the increased licence “effort” (i.e., an increase in the number of individuals in the fishery cannot occur without a reduction in the amount of cockles landed per vessel). In general, the Eastern IFCA must try and maintain the same levels of effort in the cockle fishery which appear to be sustainable and providing robust business models for most licence holders. Note, that we recommend the same “effort”. The number of licences / permits issued in the new byelaw must therefore account for the number of inactive licences as well (which we understand is between 2 and 5 depending on the year).
- If the number of licences are to be somewhat dynamic, the fishery stakeholders must be given security and solid timeframes to expect changes to occur over. Changes / the dynamism should not occur over annual timescales.
- We do not believe that licences should be rented out or traded and the Eastern IFCA needs to ensure licences are actively fished (not sat dormant) so that the fishery can be exploited to a maximum sustainable yield.
- We believe that the Eastern IFCA should look more closely at multiple licence holders and if such “ownership” is maintained, then these individuals should be held accountable to a certain standard when it comes to the remuneration of crew and nominated individuals.

Data collection recommendations

- We recommend that the Eastern IFCA formulate a stringent data collection framework as part of the new byelaw in which all licence and permit holders are required to submit key data and information on a regular basis to the IFCA. We are sure that some sort of program currently exists but believe that the formation of the new byelaw will be a useful opportunity to formalise such data collection standards and write the terms of such into the new policy.
- We suggest that the Eastern IFCA decide on the key business models that they see as appropriate to classify individuals with and use them to classify their data collection. These models may also be used to verify that stakeholders in the fishery are acting in accordance with the rules and facilitate the recording of any changes in behaviour relevant to the Wash management. We would hope this would also help reduce the likelihood of non-compliance when it comes to licence renting.

Concluding remarks

The sustainability of the Wash fishery is clearly in the minds of all of those who rely on it for their livelihood. No fisher wants to see their fishery become unsustainable. The Eastern IFCA has an important opportunity with the new byelaw formation to set out a plan that ensures both ecological sustainability and economic viability for those relying on the Wash as their primary source of livelihood. Whilst we do not recommend increasing the number of permits the Eastern IFCA should remain dynamic and open to suggestion and new ideas when it comes to permit distributions to try and find the right balance between ecological sustainability, economic viability, and equality amongst its stakeholders.

Appendix

Appendix 1. Survey questions

Table 4. Survey questions asked to the Wash fishermen as part of the Wash economic assessment. The table shows the questions listed, which stakeholders were asked each question and the way the answer was recorded.

Question	Which stakeholders asked?	How the answer was recorded.
Name	All Stakeholders	Text
Age	All Stakeholders	Number
Email Address	All Stakeholders	Text
Ltd Company	All Stakeholders	Y/N
Company name	All Stakeholders	Text
Are you actively fishing in the Wash?	All Stakeholders	Y/N
How old were you when you started fishing?	All Stakeholders	Number
Which fisheries have you worked in the last five years?	All Stakeholders	Selection (Cockles, whelk, shrimp, mussels)
Do you currently hold a licence?	Licence holders	Y/N
How long have you held that licence?	Licence holders	Number (years held)
Are you a nominated representative on someone else's licences?	All Stakeholders	Y/N
Do you work under any family-owned businesses?	All Stakeholders	Y/N
As you don't hold a licence, do you rent a licence?	Non-licence holder	Y/N
Are you on the waiting list for a licence?	Non-licence holder	Y/N
What date did you apply for a licence?	Non-licence holder	YYYY/NA
On a scale of 1-5, how difficult was it for you to get a licence? With one being very easy and five being very difficult.	Licence holder	Scale of 1-5
Have you faced any barriers to accessing a licence?	All	Text- notes
Do you own any boats? (if yes -->) How many boats do you own? What are their names?	All	Text (boat names)
What year were the boats built?	Vessel owners	YYYY
What year did you purchase each of them?	Vessel owners	YYYY
Can you remember how much you paid for the boat(s)	Vessel owners	Number £
How much do you think the boat(s) is currently worth?	Vessel owners	Number £
Which of your boats have (catch) refrigeration on them?	Vessel owners	Name of boat with refrigeration
What is your average (ongoing) annual upkeep costs on your boat(s)? - not thinking about major refits.	Vessel owners	Number £
Have you had any major boat expenses in the last 5 years?	Vessel owners	Y/N/NA
What was major expense for?	Vessel owners	Text- notes
Do you have any major investments in your vessel planned / upcoming in the next 3 years?	Vessel owners	Y/N/NA
What is the upcoming major expense?	Vessel owners	Text-notes
When do you think your boat needs a major refit?	Vessel owners	Number
When have work done on your vessel, who does the work?	Vessel owners	Text-notes
For each fishery how many people are you usually working with onboard?	All- for each fishery worked	Number
Do you work with the same crew regularly? (And does it differ per fishery?)	All- for each fishery worked	Y/N

If there is a high turnover / mix of crew, what may be the reasons for that?	All- for each fishery worked	Text-notes
How many of the crew that you work with are part of the same family?	All- for each fishery worked	Number
Do you work with any female crew?	All- for each fishery worked	Y/N/NA
Do you employ crew yourself?	All- for each fishery worked	Y/N
How do you pay your crew (share, fixed rate, mix / blended model) Share = % of catch, fixed daily rate or a mixture.	All- for each fishery worked	Share/fixed rate/ mixed
Details of pay (amount, % fixed versus share)	All- for each fishery worked	% of share or day rate £
Does the crew pay differ depending on age, experience, if they are family?	All- for each fishery worked	Age/experience/family/NA
For each fishery what is your strategy in general - are you selective of just work fast to fill your quota?	All- for each fishery worked	Selective/fast
What are your trip lengths for each fishery (on average in hours)	All- for each fishery worked	Number
How much fuel do you use per trip, per fishery?	All- for each fishery worked	Number/ Litres
How much do you sell your catch for per tonne?	All	Number £
Do you know how much a tonne of meat is sold for (catch minus shells)?	All	Number £
Do you ever sell any of your catch yourself? (or does it all go to a processor?)	All	Y/N
Who do you sell your catch to generally?	All	Text- notes
How much do you pay per tonne of catch?	Processor	Number £
How much do you sell your processed catch for?	Processor	Number £ / tonne
What is your expense to profit ratio approximately? For every £100 for example that you make from the fishery, how many is used for fishery expenses and how much is profit.	All	Fraction
How much profit (approx.) does your business earn in an average year?	All	Number £
How do your profits change / differ with each fishery? As a % of your total profits	All	%
What do you try and take home yourself as salary each year?	All	Number £
Have you ever had any bad years where you've made little to no profit?	All	Y/N
What was the reason for poor take home / loss of earnings?	All	Text-notes
How often have such "bad" years happened?	All	Number
Are you worried about the sustainability of any of the fisheries? Which ones?	All	Y/N
IF so - why?	All	Text-notes
Do you work in any other jobs or own any other businesses?	All	Y/N
What are these jobs / businesses?	All	Text-notes
Do you have plans to use your licence for your retirement - if so - how will you do this?	Licence owners	Rent / sell / No / NA
If no to previous - Do you agree with people using their licences for their retirement plans?	All	Y/N
What are your reasons?	All	Text- notes
Any last thoughts on the upcoming Byelaw design and replacement of the WFO? Are you worried, keen to see more / less licences / certain rules / strategies in place/ fairness - what is fair / will be fair.	All	Text-notes

Appendix 2. Percentage of landings – selling location

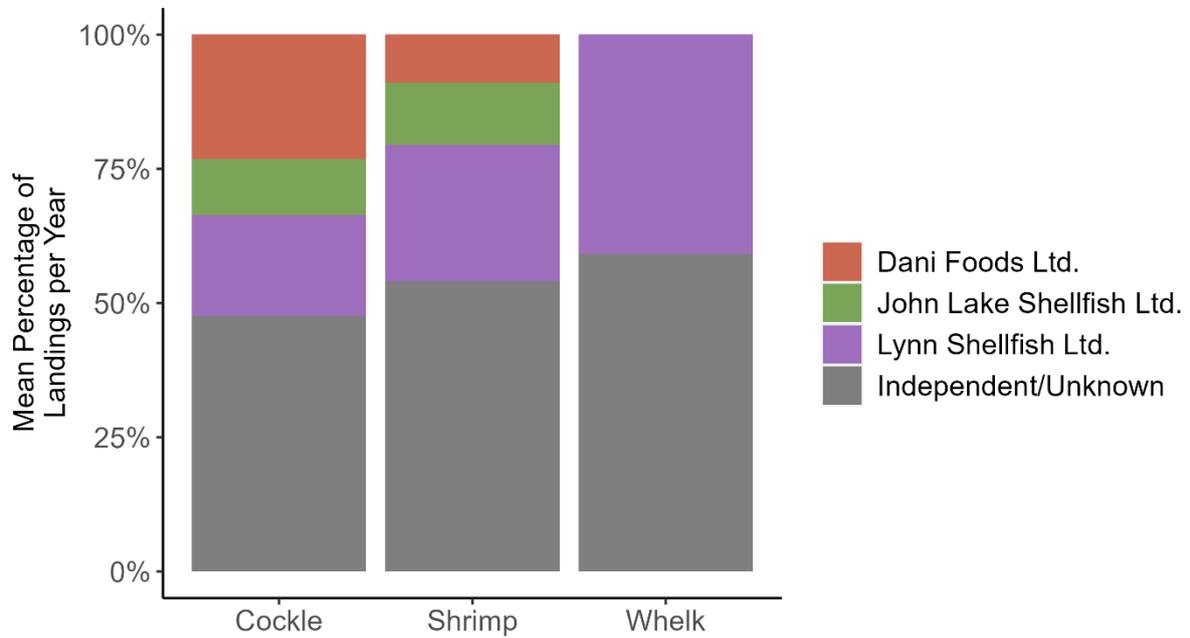


Figure X: Mean percentage of landings that are estimated to go to each of the known processors in the Wash per year per fishery. These data were derived from answers from KI interviews.

Appendix 3. Any final thoughts on the upcoming byelaw?

Table X. Responses from interviewees when asked if they had any last comments about the upcoming Wash byelaw (not ordered in any priority)

Believes that is fishermen and EIFCA both want commitment on each side then they should commit to fishermen with another regulatory fishing order, then they will all know where they stand with each other. He has invested a lot in the fishery in the last few years and now regrets it. Wants EIFCA to invest/ commit to him so that he can have secure work. Believes the byelaw is a joke and that the WFO has worked for the last 30 years - so shouldn't get rid of it.
Big concern - uncertainty now. Doesn't want to see more licences - evidence shows that fishery is working on what we have now. Permits need to be right. Skippers should hold the licences not vessels.
Can see why entitlement like current WFO because of job security. But it's very open to abuse, gives people to option to rent out, retirement plans etc. Licences should become available to those wanting to fish in the fishery. Worried that EIFCA might use this to shut the fishery down.
Change of management - EIFCA - Can't have conservation and fishing at the same time. Too close with English Nature. Not enough experience in management.
Concern around no guarantee that he'll get a licence in the system - lack of security.
Concerned about complicating matters, concerns about an increase in licences due to too many boats in the Wash already. Biggest concern is that EIFCA will be able to revoke licences and stop people being able to go to work. He thinks a yearly byelaw will give EIFCA too much power and it worries him that they will eventually close the whole fishery for environmental reasons.
Concerned there will be a free for all for shrimps. Heard something about there been an allocated number of tows allowed (for shrimp?) per year and when that number is met the fishery will be closed. He doesn't like that idea and thinks it would be a bad idea.
Desperately want another order (30 years) guarantee a fishery for 30 years. A lot of people are against the permit scheme because they don't truly own the permit they have. Don't want people forming companies that can then bring someone in who has two entitlements or so that wants to retire. – bending the rules is a serious concern. Large companies have around 25 entitlements for their boats between them - worries that they aren't going to be taken away from them - worried they will take the entitlements from the independents.
Doesn't want to see any more licences. Hopes to ensure he can continue with cockle.
Don't need more licences - retired ones should pass them down. Currently a lot of boats in the Wash (and Thames boats coming up).
Don't want any change - doesn't want a permit scheme- no security. Believes EIFCA will shaft the fishermen. Permit scheme will be the death of their industry - EIFCA cannot be trusted. Now, fishermen do have a say, but with the new permit they'll have nothing.
Entitlement should be passed down to family. Not used as a retirement plan. This is not a problem. What EIFCA is going to do with the byelaw is unsustainable, no security with a year permit. No way to get a loan. Worried about more licences just to increase EIFCA income. Reduced number of species will squeeze fishermen. Should be gone about like the Thames Estuary fisher. Overall, respondent wants a new order.

<p>Going to be the same old cartel. No way into the job. There should be more licences for younger generation- take licences that from those that hold multiple and / or rent them out. Fishery being run badly. He is seeing so much waste and destruction in the cockle fishery especially. There is far too much effect and pressure put on the fishery now, more than ever. Massive problem with drink and drugs on boat vessels.</p>
<p>He has no problem with the fees and agrees EIFCA should hold the permits – people that follow the rules should get the permit – use common sense. If they follow the rules, then they should be given a permit. Doing what is best for the sustainability of the fishery, not for themselves. He doesn't want the permits to end up in the processor's hands – as he believes this will cause a monopoly over the permits. Fishermen will then be forced to go out for far less than they deserve. He wants more hope for getting a permit in the future (young ones) Accessing the fishery for younger generation is important.</p>
<p>Hopes to see a change to method of fishing to see what has happened from dredging to hand gathering -he doesn't think the hand raked cockles is not hand gathering at all as they use blow out method - Small cockles not put back or given time to resetttle before tide comes. Also hopes to see a reduction in licences - for environmental sustainability reasons.</p>
<p>Industry need to be asked what they would like before the decision on made about a byelaw similar to Thames byelaw. Fishermen are being diluted. Must keep a close relative option e.g. family takes over licence if something happens to them. EIFCA poor management. Mental health and stress problems but EIFCA doesn't seem to care.</p>
<p>Keen to see if he can have a cockle entitlement. Fisheries have improved - currently grounds are covered in shells - improved environment and better licencing should mean young people don't have to work for a company to get access.</p>
<p>Leave it the same, stick with a byelaw.</p>
<p>Like to see skippers and boat owners in control of licences rather than processors. Fishermen actually used their own licences they would have more of a say on what goes on and prices will rise.</p>
<p>Happier with the situation now after speaking to EIFCA. Was previously concerned that there wouldn't be as much legal protection with a permit. But now feels more settled.</p>
<p>More opportunity for people to get into the fishery. Could give one permit per family if not everyone can have one then at least there is a way in to give future for generations - not the processors.</p>
<p>Much rather see a new order, with everything transferred as is (all those with licences now carry on). Gives certainty and promotes investment and people know what they have (security) for the new 30 years. Only thing in the way is nature if it doesn't provide enough fish biomass.</p>
<p>Needs to be a regulating order not a permit. Cannot be a single year permit. A single small fishing family can't survive on that. Big companies will push small families out</p>
<p>Needs to be more punishment for those that rent out licences - currently far too easy to rent a licence - people can access the fishery just not legally. He wants to see an MSC certification on the fishery in the future to improve sustainability and profit. Concerned over losing the Wash order- he agrees with EIFCA that there should be a shakeup of entitlements as there is lots of fraud going on currently with licences being rented. He is worried that because management are aware of this, that it will be overlooked. Scared that people renting the licences are going to be given the licences and that those waiting patiently and following the rules are going to be pushed out. Wants to see selective fishing and profit favoured over constant fishing and working the fisheries.</p>

No one should have more than one licence and they must be local, not from other areas. There are too many licences for those full time within the wash - the current situation doesn't work well. Those only working a few fisheries a year causes others to have to rent their licences to make full time work. People should have been in the industry at least 5 years before they are entitled to a permit /licence.

Not a problem with a new byelaw - only worry is if there is going to be finite amount of licences, then hopefully individual licence owners get to keep - worries about it being pulled out of the hat sort of thing. Doesn't agree with multiple licence holders.

Not had a problem with a fishery in the past. Shouldn't have let outside boats in. Should favour local fishermen. Should never have allowed people to have multiple licences if they had an entitlement.

Not having a licence has stopped him from getting to where he wants to be. Worried that those people that have been defrauding the licences for past 10-15 years are going to benefit from the system. People like him and others and young generation are going to not get a licence out of this - talk from IFCA now is that renter will get a licence (views renting as committing fraud). He has also heard that EIFCA are throwing away the waiting list- feels that why should the renters benefit when some people have been on waiting list and doing what they should be doing. He has stuck to the rules and believes he will miss out to those that have broken the rules and rented (fraud) a licence - says it is against the rules in the licence terms.

Permits should only be given to people in the fishery. Licence should be held by a skipper with one nominated. Hopeful that there will be more - given to those that deserve them. People that have stayed in the industry all their lives. Why are people who are not actively fish / or haven't ever get a permit. People are worried. Processors are worried about losing entitlements - they're employing people. Entitlements should be available but should also give more permits to young generation.

Renting licences should be stopped.

Same licences should be kept but doesn't believe in licences being given out to fishermen not living in the area. Wants to be able to hand his licence down to family.

Seen EIFCA leave and let the fisheries run it. Think it is currently being reduced to a bird sanctuary and the fishery is being pushed out. He wants to see another order and not a yearly byelaw.

Shouldn't be any more licences issued. Certainly not a permit fishery- no security for businesses. Permit fishery is fine if there is a good year but in bad years, EIFCA have the power to withdraw licences. Need to change certain fishing practices - in favour of dredge cockles on certain sands. Hand working seems biased to small boats - not wanting bigger boats to do well. Need to change the min landing size - be stricter- not just filling up bags with small cockles is bad - need them to keep the fishery going. Would like some security around what will happen to the licence he is nominated on once the holder retires.

Suggestions from EIFCA seem overcomplicated. Roll present rules and regulations over in some way into the byelaw.

The WFO has been run very well for 30 years. People coming into it are trying to get rid of it and get rid of them.

Thinks surveys are pointless. Not enough fishermen interaction. Believes that EIFCA doesn't need to use an expensive boat for surveys, as it can be walked (over sands). Wants to make sure his nephew gets his licence.

<p>Waiting list doesn't really work. Larger companies are holding the entitlements - which he believes is wrong (discriminating). Entitlement should be on the person (skipper). Whelking should be restricted to 300 pots (currently 500 pots) - overfished now. Shrimping should have reduced to smaller gear - too intensive/heavy. Must go back to go forward really - Not so industrialised.</p>
<p>Wants it to go back to old ways with councillors etc. Fishermen in the councils etc. Needs to bring knowledge. Get rid of EIFCA and the damage they do. Wants fishermen to be listened to,</p>
<p>Wants licences to be more evenly spread out - those that have multiple shouldn't. EIFCA should give out the licences that they're holding. Wash used to be run very well- fishermen want to help with management and have offered to help with surveys.</p>
<p>Wants to be able to hand his entitlement down to his son. Happy to keep the same number of entitlements -but there is a large lack of security and unknown.</p>
<p>Worried - been on the waiting list for a long time. Access to that fishery could earn him a living.</p>
<p>Worried - next year is last year -no security in 2023 following Byelaw. Going to jump through hoops to get permit - not guarantee we'll get one. 99% of Wash fishermen don't want to. Most want order to remain. Worried about reapplying for a licence every year.</p>
<p>Worried about EIFCA getting too much control. No security in what they say. Worried shutting areas off for unrealistic reasons e.g. closing fishing grounds for plankton protection? Needs to a common ground of realistic fishery meets sustainability. Says EIFCA seems set on holding the English fishery communities back - Scotland have got it right.</p>
<p>Worried about it. Has held licence since the beginning (30 years) - concerned that by removing the WFO and working in such a high designed (environment) site - people may push the fishery out of the area. WFO gives better protection than byelaw will.</p>
<p>Worry about being priced out - as a small operator. Yearly fee for permit is worrying - when a fishery isn't open, people would have to pay a lot for the permit and not even be able to fish. The fees are a lot of money if you are not actively able to get anything for that. Anything that can be done to mitigate impact to those only active in one fishery ? (if it doesn't take place that year).</p>