SEAFISH

Best Practice Guidance for Assessing the Financial Performance of Fishing Gear: Industry-led gear trials

Prepared for
The UK Fisheries Economic Network (UKFEN)
by Seafish

Introduction and Background

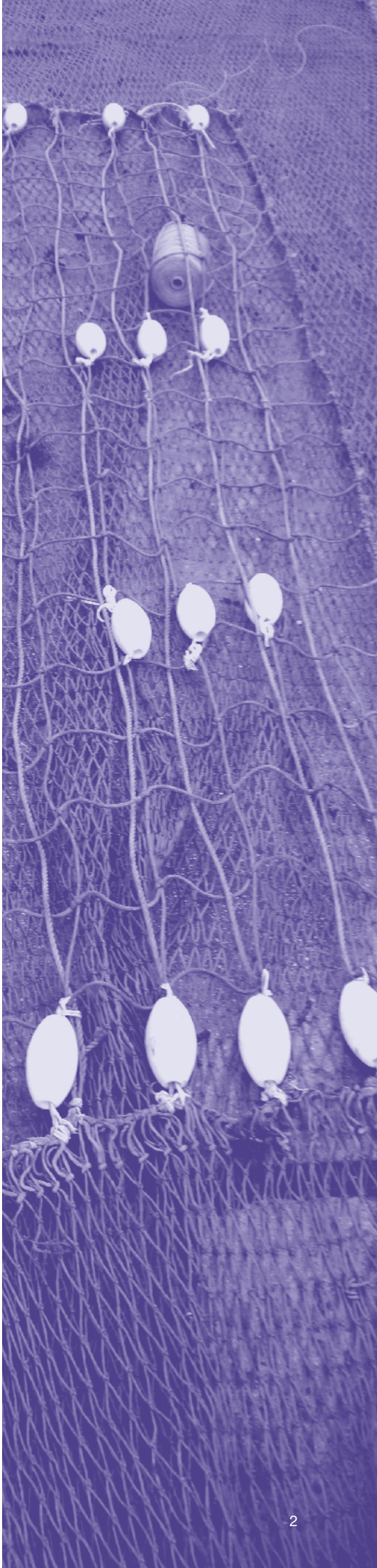
Reducing costs and increasing revenues are clear goals for all businesses. Increasing gear selectivity is one way for vessel owners to increase operating profit and help improve stock sustainability. Modifying or redesigning gear can be a practical and common way for many vessel owners to increase fishing selectivity.

Changing gear selectivity can alter operating costs and fishing income. Vessel owners may not want to change their standard gears because they are uncertain about the costs and benefits of gear modifications. Modified gear must be financially viable and meet legislative requirements if vessel owners are to change their gear. Before gear modifications are adopted, it is necessary to assess the financial consequences of gear modifications to make sure fishing operations remain profitable with the new gear.

This *Best Practice Guidance* for industry-led gear trials is designed to help vessel operators assess the financial viability of gear modifications and complete gear changes. Seafish has also produced a longer, more comprehensive, *Best Practice Guidance* for supervisors of scientist-led gear trials.

The purpose of this Guidance is to:

- ✔ Make vessel operators aware of what data to collect and when to collect it so that they can plan ahead of gear trials and make sure the required information is collected for the financial assessment;
- ✔ Make it easier and faster for those involved in fishing gear trials to compare the costs and revenues from using old versus new gears or from changing tactical decisions of when and where to fish;
- ✔ Provide a standardised approach for assessing and reporting the financial effectiveness of experimental gear so results can be accurately compared between gear trials.



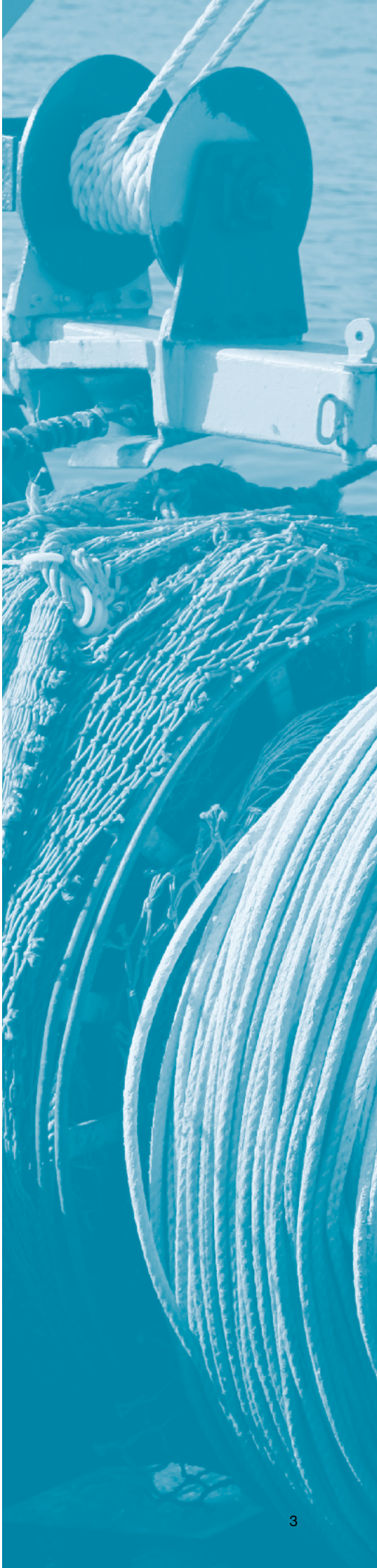
How to Assess the Financial Effectiveness of Fishing Gear

It is important to plan ahead and make sure that the necessary information for the financial assessment is collected before, during and after the gear trial. All factors that could impact the costs, revenues and characteristics of the trial should be considered in the financial assessment. The more information that is included in the assessment, the more accurate and comparable the results will be.

The financial assessment is only as reliable as the data collected. Weather conditions, fish abundance, time of year and many other factors can influence the performance of fishing gear. Standardising as many variables as possible across trials (e.g. fishing grounds, weather conditions) is important when designing a gear trial so that financial results can be compared across trips. Vessel operators can get a more realistic understanding of the year-round financial effectiveness of a gear modification if more trials are run with the same gear in different conditions (e.g. fishing at different times of year or on different fishing grounds). Table 1 provides a general data collection timeframe.

Table 1. Financial assessment data collection timeframe.

WHEN TO COLLECT DATA	WHAT DATA TO COLLECT
BEFORE DEPARTURE	Fuel price per litre, vessel identification, vessel length, engine power, gear type, gear modification, list of top target species, trial goals
DURING THE TRIP	Catch composition (weight of each species and size grade of catch)
AFTER LANDING	Sales value of catch (either actual or estimated) by species and fish size grade, estimated amount of fuel used (litre), crew share, fixed crew wages, other estimated fishing costs (e.g. ice, bait), number of valid gear deployments, overall time spent fishing, average fishing distance, average fishing speed, average depth of gear use, date of departure, date of landing, port of departure, port of landing, fishing grounds, sea state, bottom type



Costs

Fishing costs could increase or decrease depending on several factors including the catch profile from the gear. For example, if the trial gear catches more fish overall, more ice and boxes may be needed to store the fish. Trip-level fishing costs to consider include:

- ✔ Fuel
- ✔ Crew share
- ✔ Quota leasing
- ✔ Ice
- ✔ Bait
- ✔ Boxes

It is also important to consider the medium to long-term costs of operating existing versus trial gears, such as gear or on-board machinery wear and the associated repair and replacement costs for each. If a vessel is towing a gear that is too big for the engine, for example, repair and maintenance costs could increase over a period of months or years.

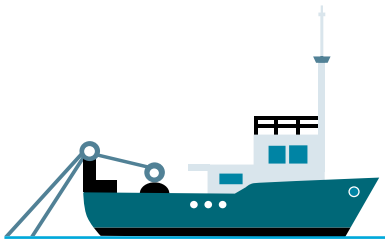
Revenues

Fishing revenues could increase or decrease depending on the performance of new gear. Gear modification can impact prices achieved for landed fish at market by changing the catch composition (species and fish size grade) and the quality of catch. If a gear modification increases catch quality or the amount of valuable catch, fishing revenues may increase. If revenues increase as a result of gear modifications, crew share, crew retention and the standard of on-board handling could also increase, further increasing crew costs but also the value of catch. The financial assessment should therefore include information about:

- ✔ Which species were caught
- ✔ The breakdown of catch by species and fish size grade (kg or boxes)
- ✔ The market prices for each species and fish size grade (actual or estimated)
- ✔ The quality of catch

Trial Details

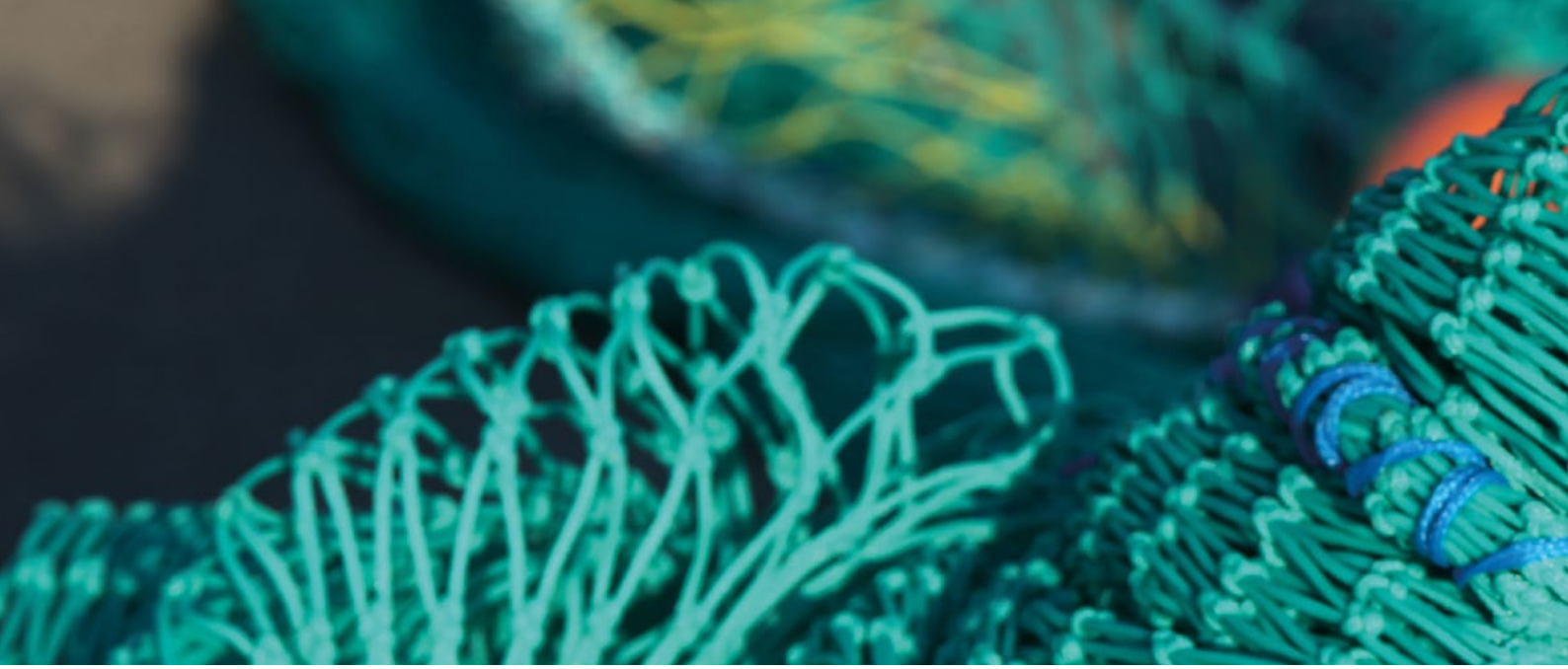
Trial details, including vessel length, gear type, fishing grounds and sea state are important to note in the financial assessment of a gear trial because they can impact the effectiveness of the gear. For example, sea state can affect both fuel use and fishing efficiency of the vessel, which can impact the financial effectiveness of the gear. Table 2 gives a detailed list of trial profile variables that could be considered in a financial assessment.



If a fuel flow metre is not installed on-board it will be difficult for vessel operators to accurately estimate how much fuel was used for towing and how much was used for steaming. If a vessel has a fuel flow metre, the average fuel flow per hour multiplied by the number of hours spent towing will return the amount of fuel used for towing. Without a fuel flow metre, the best way to measure fuel use is by recording the total amount of fuel in the tank before and after the trip and subtracting the amount of fuel in the tank at the end of the trip from the amount of fuel in the tank at the beginning of the trip. If fuel use is calculated in this way, fuel use estimates will include fuel used for both steaming and towing, as opposed to just towing.

Table 2. Trial profile variables to consider in a financial assessment of selective fishing gear. The most important variables are marked with an asterisk.

VARIABLE	DESCRIPTION	RELEVANCE
VESSEL INFORMATION		
Vessel ID (name and PLN)	Vessel name and port letter and number (PLN) as shown on the vessel	Vessel identification allows for comparison of vessel performance across trials and provides a history of which vessels have trialled which gears
Vessel Length (m)	Overall length of the vessel	Vessel length will often influence the size of gear trialled
Engine Power (kW)	If the kW value is unknown, the total horsepower (hp) of the vessel can be recorded instead	Larger engines will likely consume more fuel but also make it easier to handle larger gears and to handle gears over difficult sea bottom-types
GEAR INFORMATION		
Gear Type*	The type of gear being used for the trial (e.g. demersal trawl)	Gear type is critical to compare vessel performance across gears and trials
Further Gear Description	This could include any relevant details related to the gear being used, for example headline length, mesh size, trawl door weight etc.	Any additional information about the fishing gear is helpful when comparing financial assessment results across gear trials
Gear Modification*	Gear modification refers to both full gear switches and alterations to standard gear	Gear modification information is critical to compare vessel performance across gears and trials
Further Description of Gear Modification	More detailed information about the gear modification being trialled , such as its stage of development, the size and placement of square mesh panels, escape panels etc.	Any additional information about the gear modification is helpful when comparing financial assessment results across gear trials
TRIAL OBJECTIVES		
Top Target Species	The top target species for the trip before fishing operations begin (e.g. the species that are targeted rather than the species that are actually caught)	This information provides context for the trial, an idea of the goals of the vessel owner in conducting the trial and the criteria for the success of the gear trial
Goals of Trial	These goals are the major objectives for each gear trial (e.g. reduce bycatch of hake)	Provides context of the purpose of the trial, the goals of the vessel owner in conducting the trial and some criteria against which the “success” of the gear can be measured
Further Description of Trial Objectives	Secondary objectives of the trial or additional information related to the objectives of the trial	Gives more information about the purpose of the trial



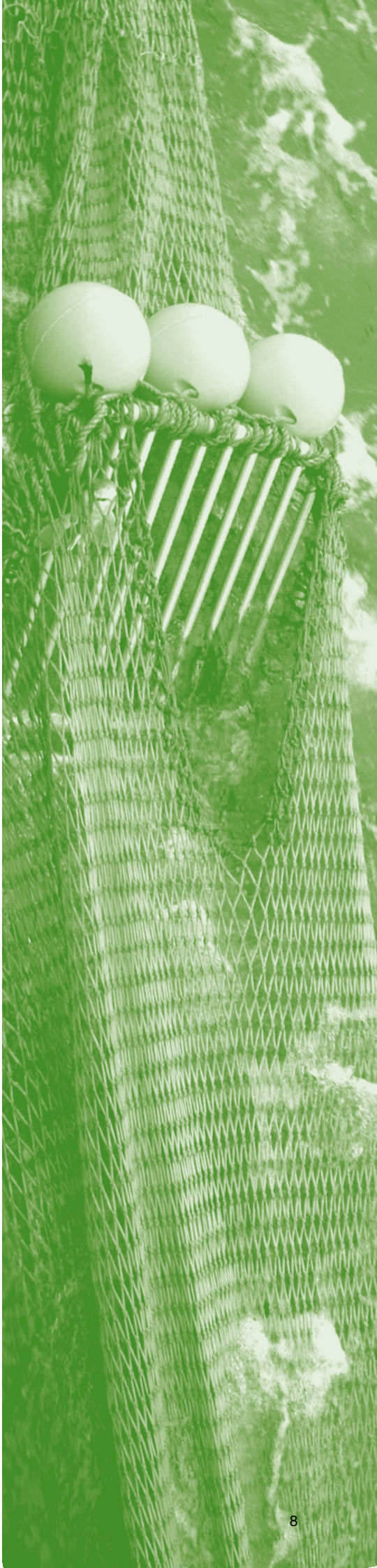
VARIABLE	DESCRIPTION	RELEVANCE
GEAR OPERATION		
Price of Fuel at Time of Trial (£/litre)*	This is the price of fuel paid before the trip (or on the day of departure)	More expensive fuel will mean higher costs per weight of catch and lower profits overall
Estimated Fuel Use During Trip (litre)*	Fuel usage is difficult to estimate without a fuel flow metre; however, providing a best estimate of total fuel used during the trip is important for cost calculations	Fuel is a substantial expense for vessel operators; more fuel means higher costs and reduced profits
Number of Valid Gear Deployments*	Depending on the gear, this could be number of gears successfully deployed (e.g. number of pots or traps) or the number of times gear is successfully deployed (e.g. number of valid hauls); details of any unsuccessful deployments should also be recorded	This can be used to estimate the fishing effectiveness of the gear per gear deployment
Overall Fishing Time During Trip (hours)*	This is the time that gear is spent actively fishing during a fishing trip and does not include steaming time to and from fishing grounds; fishing time will depend on the gear type e.g. the time spent towing (for towed gears) or soak time (for net or line gears)	Overall fishing time can be used to estimate the average revenue per hour of active fishing (£/hour)
Average Tow Distance (km)*	The average distance towed per haul (this is only relevant for towed gears)	Average tow distance can be used to estimate the average fishing effectiveness over the average distance towed
Average Tow Speed (knots)	The average speed while towing (this is only relevant for towed gears)	Average tow speed can be used to estimate distance if the overall fishing time during a trip is known and can then be used to calculate the average revenue per km of towed distance
Average Depth of Gear Use (m)	Depending on the gear type, this could be the average trawl depth or the average depth at which static gear is placed	Average depth of gear use can provide additional information that may be useful in evaluating the overall economic performance of fishing gear (for example, if a trial gear is used in shallower water than the standard gear, it will likely have a shorter deployment and retrieval time which may affect other variables (e.g. fuel usage, number of gear deployments etc.) during the trial)

VARIABLE	DESCRIPTION	RELEVANCE
WHEN AND WHERE		
Start Date of Trip	The date of departure	The average sea state during different seasons will affect both the fuel and fishing efficiency of the vessel; the probable abundance, size structure and size composition of stocks in the area being fished are also likely to vary seasonally
End Date of Trip	The date of landing	The length of the trip impacts fuel consumption, quantity and freshness of catch and can be used to estimate the fishing effectiveness over the length of the trip
Port of Departure	The full geographic name of the port of departure (e.g. Peterhead, Scotland)	Distance to fishing grounds impacts steaming time and fuel consumption
Port of Landing	The full geographic name of the port of landing (e.g. Peterhead, Scotland)	Distance back to shore from fishing grounds impacts steaming time and fuel consumption
ICES Area	The ICES area(s) where fishing activities took place	Different fishing areas support different marine ecosystems which impacts species abundance and catch composition
Common Name of Fishing Grounds	The common name used by fishermen for specific fishing grounds (e.g. Dogger Bank)	The common name of fishing grounds provides additional information that may be useful in the assessment of the gear trial, particularly if gear trials are undertaken in different fishing grounds within the same ICES area, as species compositions on these grounds may be different
FISHING CONDITIONS		
Sea State	The sea state describes the fishing conditions during the trip, including wave height and wind speed	The sea state affects both fuel consumption and fishing efficiency of the vessel
Bottom Type	The bottom type describes the type of seabed where the gear is being operated (e.g. rocky or sandy)	The bottom type can have an impact on gear efficiency (for bottom gears) and influence fuel consumption during the trial; fishing on difficult bottom types will reduce the effectiveness of fishing operations

Data Sharing

Sharing information on gear designs and modifications, and the performance of gears will help reduce uncertainty for other vessel operators looking to trial new selective gears aboard their own vessels. Efforts are being made to help fishermen, net makers and fisheries managers find practical ways to reduce bycatch in commercial fisheries through data sharing. The GearingUp project, which was launched in November 2017, aims to bring together data from scientist and industry-led gear trials and make it available to fishermen searching for guidance on how to adapt their own fishing practises to reduce unwanted catches and eliminate discards.

Sharing financial assessments of new gear or gear modifications will also help the fishing industry as well as scientists and managers better understand how gear modifications affect the profitability of fishing operations. Understanding if a gear change is more economically viable for a vessel operator than fishing with existing gear will put the fisheries sector in a better position to voice their own concerns relating to any new management proposals or decisions that do not appear to align with the economic needs of the industry.



The Financial Assessment Spreadsheet

Seafish has developed a *Financial Assessment Spreadsheet* for vessel operators to use alongside this *Best Practice Guidance*. Vessel operators can use the *Financial Assessment Spreadsheet* to enter data collected from gear trials and estimate the financial effectiveness of fishing gear modifications.

The Excel spreadsheet calculates fishing income based on catch composition (species and fish size) and market prices. The spreadsheet generates a trip-level financial assessment of the gear, which can be compared across trips, trials and scaled up by the user to estimate longer-term financial impacts of gear modifications, such as annual financial gains or losses from using modified gear. The current version of the Excel spreadsheet is designed for towed gears only; however, it can easily be modified to suit other fishing gears. Users can download the Excel spreadsheet here.

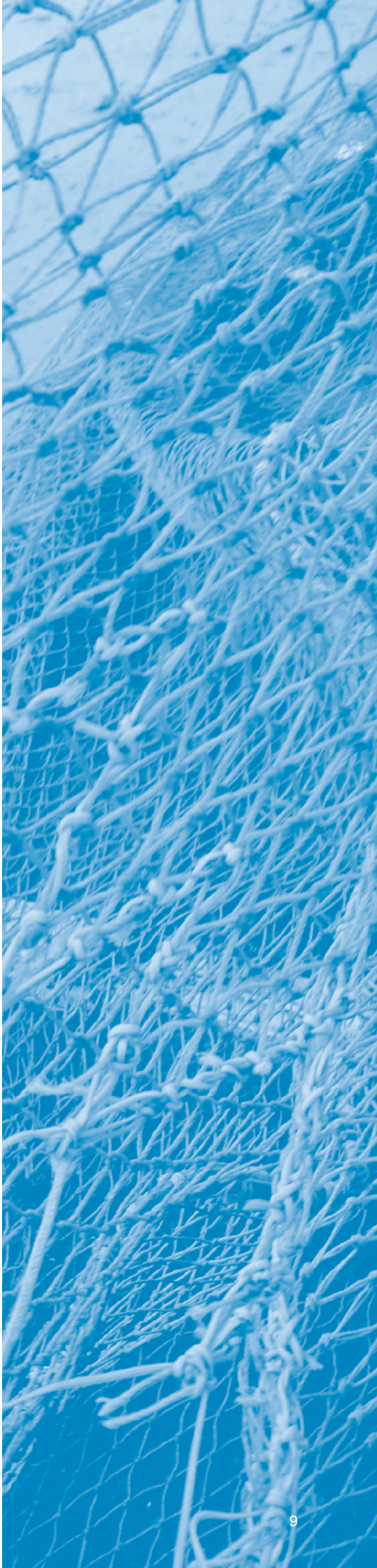
Using the Excel spreadsheet

The Excel spreadsheet is designed for trip-level data. Catch data from each haul should be entered into separate haul sheets. If two gears are towed at the same time, catch and revenue data from each gear should be recorded separately if possible. Even if catch from different gears must be combined before sale, vessel operators are encouraged to record the species and size composition of catches from each gear separately before catches are combined for sale.

20 individual haul sheets are provided in the Excel spreadsheet along with a *Trip Summary* sheet which pulls together key summary calculations from the trip. If more than 20 haul sheets are needed, users can copy the Excel spreadsheet within the same Excel document or start a whole new Excel document for the additional gear trial data.

The Excel spreadsheet is split into 5 main sections:

- ✔ **Trip Profile:** basic information about the vessel, fishing gear and the gear trial;
- ✔ **Catch Profiles:** breakdown of the quantity of catch from each haul by species and fish size grade;
- ✔ **Revenue Profiles:** total sales value by species and fish size grade for marketable catch from the standard gear and for marketable catch from the trial gear
- ✔ **Cost Profile:** estimated trip costs for the standard gear and the trial gear
- ✔ **Trip Summary:** financial assessment of the standard gear and trial gear based on the *Cost and Revenue Profiles*, catch assessment for the standard gear and trial gear based on the *Catch Profiles*, and an overall trip assessment of the gear and gear trial.



The Trip Profile

Users can complete the *Trip Profile* section by providing information about the vessel, gear type, trial objectives, gear operation, time and location of the trip and fishing conditions at the time of the trip. This information is useful when comparing trial results across vessels, gears, and trips undertaken at different times of year, in different fishing locations, and under different fishing conditions. Some of the *Trip Profile* data should be collected before the start of the trip and some won't be possible to collect until the trip is underway, or after the trip is over. Users can refer back to Tables 1 and 2 for further information about when to collect the *Trip Profile* data and the details requested in the *Trip Profile* section.

The Catch Profile

Users should enter catch data from each haul into the *Catch Profile* section of a separate haul sheet. More species can be added to the *Catch Profiles* by clicking the "+ ADD Species" button to the right of the *Catch Profile* table. In the haul summary the total amount of marketable and non-marketable catch is automatically calculated for each haul. All information in this section of the Excel spreadsheet is critical to calculations in the *Trip Summary* at the end of the Excel spreadsheet.

Step 1: Select whether the gear used for the haul was "standard" or "trial" gear.

Step 2: Select the species name from the drop-down list provided. The species list includes species commonly caught by the UK fleet. If a species does not appear on the list, enter the name of the species in the yellow cell below marked "if other species*, please specify".

Step 3: Enter the total quantity (kg) of each size grade of the species that is marketable and the total quantity (kg) of each size grade of the species that is non-marketable. Marketable catch refers to any catch that can be sold and includes both target species and marketable bycatch. Non-marketable catch refers to catch that has no market value and may include damaged catch, catch that is discarded (non-quota species) or catch that would have been discarded prior to the discard ban (quota species). Fish size grades are based on official EU regulation as recorded on the market and have been limited to five categories in this Excel spreadsheet.

Step 4: If more than one species is caught in the haul, click the "+ADD Species" button to add another set of rows. Repeat steps 2-4 until all the species caught in the haul have been recorded. Total catch quantity (kg) is automatically calculated at the bottom of the *Catch Profile* table for each haul.

The Revenue Profiles

Users should enter the total sales value (£) of all marketable catch by species and fish size grade. If possible, catch from the standard gear and trial gear should be stored, sold and recorded separately in the "Standard Gear Revenues" sheet and the "Trial Gear Revenues" sheet. If catches cannot be kept separate, total sales values for combined catches can be recorded in either the "Standard Gear Revenues" sheet or the "Trial Gear Revenues" sheet; however, in this case, it will be harder to compare the financial effectiveness of the standard gear and the trial gear.

Sales values can either be estimated by the user before sale, based on their knowledge of the market, or can be the actual sales values that are achieved at market. If recording actual sales values, the *Revenue Profiles* cannot be completed until the vessel owner has received the sales details from the trip. If catch is landed outside the UK and sold in a different currency, users should assume that all values are in the foreign currency and add a note of the currency in the space for "additional comments" in the *Trip Summary* sheet. Users should note that all non-marketable catch, by definition, has a sales value of £0 and all "undersize" catch is considered non-marketable. Total sales values of catch (£) are automatically calculated at the bottom of the *Revenue Profile* tables. All information in this section of the Excel spreadsheet is critical to calculations in the *Trip Summary* at the end of the Excel spreadsheet.

The Cost Profile

The trip expenses for the standard gear and trial gear should be estimated separately, including the cost of fuel, crew, quota leasing, ice and boxes. Total fuel cost (£) is automatically calculated based on the amount of fuel used (assuming the same price per litre for standard and trial gear).

The total estimated trip costs for each gear are automatically calculated at the bottom of the *Cost Profile* table. All information in this section of the Excel spreadsheet is critical to calculations in the *Trip Summary* at the end of the Excel spreadsheet.

Trip Summary and Excel Spreadsheet Outputs

The overall trip assessment section of the Trip Summary sheet should be completed by giving a qualitative assessment of the catch quality from the gear modification, the overall performance of the trial gear and thoughts on the gear trial overall. Fishing gear is understood to impact catch quality which can then impact prices achieved at market. Providing information about the quality of catch from the trial gear can therefore suggest how the gear modification impacted catch value at market.

At the top of the *Trip Summary* sheet, the Excel spreadsheet produces a financial assessment of the trip, considering fishing income from target catch and marketable bycatch, and estimated fishing costs for both the standard gear and the trial gear. The financial assessment provides crew share and vessel share estimates from the trip. The spreadsheet also summarises the amount of marketable and non-marketable catch from the standard gear and trial gear for comparison.

Users can provide feedback on the *Financial Assessment Spreadsheet* at the bottom of the *Trip Summary* sheet. The comments provided in the feedback section will help improve future editions of this resource.

Share Feedback and Results

If users need assistance on how to estimate cost variables, how to account for cost variables outside the scope of the current spreadsheet or are interested in modifying the Excel spreadsheet for other gear types, please contact Seafish at geartrialeconomics@seafish.co.uk

Seafish understands that the information included in the financial assessment of a gear trial may be business sensitive; however, for interested users, completed *Financial Assessment Spreadsheets* can be shared confidentially with the Seafish economics team to help inform other users and stakeholders interested in gear trials. Shared data may be used anonymously for Seafish reports and in fisheries economics working groups in the UK and Europe. No individual vessel will be identified in any report and no vessel level information will be supplied to third parties. Please contact Seafish with comments, queries and completed *Financial Assessment Spreadsheets* at geartrialeconomics@seafish.co.uk

**This Best Practice Guidance and Financial Assessment Spreadsheet were informed by a technical workshop run by Seafish on 4th May 2017 in Edinburgh. At the workshop industry experts reviewed the information and approaches needed to assess the financial implications of fishing gear trials.

ADDITIONAL SUPPORTING RESOURCES:

- For more detailed information on assessing the financial effectiveness of experimental fishing gear see the *"Best Practice Guidance for Assessing the Financial Effectiveness of Fishing Gear: Scientist-led Trials"*, which is available for download from the Seafish website.
- The "Financial Assessment" Excel Spreadsheet has been developed with pre-defined calculations to help vessel owners in the financial assessment of fishing gears and can be downloaded from the Seafish website.

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