



VALUING WA SMALLER COMMERCIAL FISHERIES ACROSS THE SUPPLY CHAIN (FRDC PROJECT: 2022-038): GUIDELINES

A Report for Fisheries Research and
Development Corporation (FRDC)

1 September 2023

Prepared by

BDO EconSearch

Level 7, BDO Centre, 420 King William Street
Adelaide SA 5000
Tel: +61 (8) 7324 6190
<https://www.bdo.com.au/en-au/econsearch>

TABLE OF CONTENTS

Tables	ii
Figures.....	ii
Abbreviations.....	iii
Acknowledgments.....	iii
Document History and Status	iv
1. Introduction	1
1.1. Purpose and scope	1
1.2. Outline of guidelines	1
2. Designing and Scoping the Study	2
2.1. Which fisheries?	2
2.2. Which parts of the supply chain?	2
2.3. What time period?	4
2.4. What region?.....	4
2.5. Which economic contribution indicators are important?.....	5
2.6. Specifying the approach	5
3. Data Requirements and Collection.....	8
3.1. Data types	8
3.1.1. Fishery production statistics.....	8
3.1.2. Fishery financials and employment.....	9
3.1.3. Supply chain flows	9
3.1.4. Supply chain financials and employment	10
3.2. Data collection	11
3.2.1. Production.....	11
3.2.2. Economic	11
3.2.3. Workshops.....	11

3.2.4. Interviews	12
4. Modelling Process	13
4.1. Supply chain value modelling	13
4.2. Economic contribution modelling	15
4.3. Presentation and interpretation of results	16
References	18
APPENDIX 1 Workshop Briefing Template	19
APPENDIX 2 Business Interview Template	21

TABLES

Table 2-1 Relevant seafood business activities	3
Table 2-2 Study scoping table	7
Table 3-1 Data sources for each approach	8
Table 4-2 Supply chain margins (per \$ of seafood use)	15
Table 4-1 Economic contribution indicators	16
Table 4-2 South Coast Purse Seine Fishery supply chain economic contribution, Approach 3, 2021/22 ^a	17

FIGURES

Figure 4-1 Example supply chain flow map, WA South Coast Purse Seine Fishery	13
--	----

ABBREVIATIONS

ANZSIC	Australian and New Zealand Standard Industry Classification
ABS	Australian Bureau of Statistics
COE	compensation of employees
FRDC	Fisheries Research and Development Corporation
Fte	full-time equivalent
GOS	gross operating surplus
GRP	gross regional product
GSP	gross state product
GVP	gross value of production
IO	Input-output
IOIG	Input-Output Industry Group
IMAS	Institute of Marine and Antarctic Studies
TLS	taxes less subsidies
WA	Western Australia

ACKNOWLEDGMENTS

We would like to acknowledge the members of the Steering Committee for the contribution of their time and expert knowledge in this study. Their ongoing contribution is invaluable. We would also like to acknowledge the workshop and interview participants for the contribution of their time, knowledge and business information, without which this study would not have been possible. FRDC project 2022-038 Valuing WA smaller commercial fisheries across the supply chain is supported by funding from the FRDC on behalf of the Australian Government.

DOCUMENT HISTORY AND STATUS

Doc Version	Doc Status	Issued To	Qty elec	Date	Reviewed	Approved
1	Draft	Chris Izzo	1 Word 1 PDF	30/06/2023	ADM	ADM
2	Draft	Phil Clark Peter Rogers Tony Della Bosca Eva Lai Chris Izzo Felicity Horn FRDC HDR Coordination Program	1 Word 1 PDF	7/07/2023	ADM	ADM
3	Final	Phil Clark Peter Rogers Tony Della Bosca Eva Lai Chris Izzo Felicity Horn FRDC HDR Coordination Program	1 Word 1 PDF	1/09/2023	ADM	ADM

Last Saved: 1/09/2023 4:18:00 PM

File Name: https://bdocomau.sharepoint.com/sites/BDOEconSearch/Shared Documents/General/ES2234_WA Small Scale Fisheries Supply Chain/WA Supply Chains_FRDC 2022-038_Guidelines_final_230901.docx

Project Manager: Anders Magnusson

Principal Author/s: Anders Magnusson, Lisa Carlin, Abbie Dix and Alex Donnelly-Young

Name of Client: Fisheries Research and Development Corporation (FRDC)

Name of Project: Valuing WA Smaller Commercial Fisheries Across the Supply Chain (FRDC Project: 2022-038): Guidelines

Document Version: 3

Job Number: ES2234

1. INTRODUCTION

This study aimed to produce information about the economic contribution of the supply chain of selected small scale fisheries in Western Australia (WA), as well as a method that can be applied to making these estimates for other fisheries.

Substantial research has been completed to estimate the economic contribution of commercial fisheries to Australia and its regional communities, and to produce guidelines that practitioners can apply to update and regionalise these estimates (FRDC project 2017-210 (FRDC and IMAS 2020)). However, past research has largely focused on the ‘upstream’ activity (also known as the flow-on effects from commercial fishing) and little work has been done to describe the ‘downstream’ activity and its flow-on effects, the focus of this study.

1.1. Purpose and scope

The purpose of these Practitioner Guidelines (hereafter referred to as guidelines) is to support managers, policymakers and industry in estimating the economic contributions of the supply chain of small scale fisheries. Ideally these guidelines would be implemented with oversight of representatives from all of these areas listed above.

This report is the third of several outputs from this study (the first being a working paper previously submitted). It presents guidelines for estimating the economic contribution of the supply chain of small scale fisheries informed by recommendations in the project report (the second output).

The guidelines do this by providing practitioners (researchers, consultants, government analysts) with an in-depth step-by-step guide describing consistent processes and protocols. These guidelines are an addendum to the *Australian Fisheries and Aquaculture Industry 2017/18: Economic Contributions - Practitioner Guideline FRDC project 2017-210* (FRDC and IMAS 2020). They are therefore written assuming a level of knowledge of the economic contribution methodology for fisheries as outlined in FRDC and IMAS (2020). We adopt the same concepts and terminology in this report.

1.2. Outline of guidelines

The guidelines consist of:

- Description of steps in designing and scoping an economic contributions study for small scale fishery supply chain (Section 2);
- Details about the data required and the processes to collect and compile the data for small scale fishery supply chain economic contribution analysis (Section 3); and
- A discussion of some of the key modelling considerations in undertaking a small scale fishery supply chain economic contribution analysis, including economic modelling framework, components of total economic contributions, use of multipliers, attribution of economic activity to regions, and interpreting results (Section 4).

2. DESIGNING AND SCOPING THE STUDY

The starting point is to scope and design the study to ensure the purpose is clear and the methods are appropriate. This section discusses a list of key questions, followed by a decision support tool. The questions and tool are based on the recommendations from this study's case study investigations.

To use the tool, add your answers to the questions posed in this section to Table 2-2 at the end of the section. Some questions are only to define important scope dimensions and are not needed in the tool.

2.1. Which fisheries?

Firstly, it is important to make it clear in defining the scope of the study which fisheries are to be included, how they have been defined and to note any exclusions. A primary consideration at this stage of scoping is whether publicly available information on the gross value of production for the fishery in consideration exists or is accessible. If these data for a fishery are confidential then you should reconsider the inclusion of that fishery in your study; or consider grouping it with another fishery to avoid confidentiality constraints. The following questions will then assist to understand the characteristics of the included fisheries to inform the research design.

How many fisheries?

- One
- A few
- Many (5+)

Large or small value fisheries (in terms of GVP)?

- Small
- Large (the recommendations made in this project relate to small scale fisheries only).

Simple or complex fisheries and supply chains?

- Very simple (single species and few products)
- Mostly simple (most of the fishery is a single species with few products)
- Complex (multiple species and products that all need to be understood together).

Are businesses in the fishery supply chain reluctant to share data?

- Yes
- No

2.2. Which parts of the supply chain?

Which activities along the supply chain need to be included in the analysis? One thing to note is that the further down the supply chain you go the more difficult it can be to get involvement of businesses. This is because these businesses are further from the specific fishery being studied and may not be particularly dependant on it. See Table 2-1 for all relevant seafood activities which could be included in the supply chain.

Answer:

- Fishing and harvesting
- Processing and wholesaling
- All the way to consumers (including retailing and food service)

Table 2-1 Relevant seafood business activities

Input-Output Industry Group (IOIG)		Relevant Seafood Activities (ANZSIC Class)	
0401	Fishing, hunting and trapping	0411	Rock lobster and crab potting
		0412	Prawn fishing
		0413	Line fishing
		0414	Fish trawling, seining and netting
		0419	Other fishing
1102	Processed seafood manufacturing	1120	Seafood Processing
3301	Wholesale trade	3601	General Line grocery wholesaling
		3604	Fish and seafood wholesaling
		3609	Other grocery wholesaling
3901	Retail trade	4110	Supermarket and grocery Stores
		4121	Fresh meat, fish and poultry retailing
4501	Food and beverage services	4511	Cafes and restaurants
		4512	Takeaway food services
		4513	Catering services
		4520	Pubs, taverns and bars
4601	Road transport	4610	Road freight transport

Source: ABS 2006

Each Input-Output Industry Group (IOIG) includes many more industries, but only the seafood components have been listed in the table to characterise the activities represented by each stage. Descriptive explanations of the activities intended to be included in each supply chain stage are:

- **Fishing** - Activity mainly engaged in the capture or harvest and sale of seafood by commercial operators. Can include some minor processing (e.g. filleting, freezing, etc.) on-board prior to sale.
- **Processed seafood manufacturing** - Activity mainly engaged in processing seafood, such as skinning, scaling or shelling, grading, filleting, boning, crumbing, battering, freezing and cooking.
- **Wholesale trade** - Activity mainly engaged in purchase and on selling, the commission based buying, and the commission based selling of seafood, without significant transformation, to businesses. Wholesaling is often characterised by high value and/or bulk volume transactions, and customers are generally reached through trade-specific contacts. Includes import and export activities.
- **Retail trade** - Activity mainly engaged in the purchase and on selling, commission based buying, and commission based selling of seafood, without significant transformation, to the general public.
- **Food and beverage service** - Activity mainly engaged in selling meals and snacks for consumption by customers both on and off-site. This includes restaurants, fast food and fish fry activities.

A challenge in delineating supply chain stages is that it can be difficult to isolate and value activity along a vertically integrated supply chain. Vertical integration occurs when different stages of production are carried out in succession by different parts of the same business (e.g. the same business owns and runs fishing boats and a factory where they process their catch). The output of one stage becomes the input to the next stage, with only the output of the final stage being sold on the market (ABS 2006). The Australian Bureau of Statistics (ABS) classifies vertically integrated activities according to their predominant activity, using value added. If no information is available to assess value added, or there are two or more activities of equal value, then the activity is classified according to the last or final stage of production where most of the value added is generally assumed to lie (ABS 2006).

2.3. What time period?

Two considerations need to be given when deciding what time period (the length of time to be covered by the analysis (e.g. the past 10 years)), and the study reference date (usually the most recent financial year) to use.

The required data, however, are often available for different time periods. For example, detailed industry employment data will be available from the most recent population and housing census or from the most recent survey conducted in the fishery, but often these will not coincide with the most recent year for which catch, effort and price data are available. Adjustments will need to be made to the data to bring them to a consistent timeframe. Details of the source data and the adjustments made should be documented clearly.

Answer:

- _____ year/s
- financial /calendar year: _____

2.4. What region?

The region for consideration will usually be captured within the purpose of the study (e.g. estimate the supply chain for the Octopus Fishery in Western Australia (WA)). If the local regional contribution is particularly important to the fishery and/or a policy decision, one key question to answer is what economic contribution you are intending to value, i.e. contribution of a fishery in a region versus contribution of a whole supply chain including beyond the region. As you move further down the supply chain (e.g. beyond processing/wholesaling), less activity tends to occur locally. Largely, the regional contribution of a fishery is focused on the fishing and processing/wholesaling activities with other activity (retail, food service, transport) mostly occurring outside the local region. For this reason, you may wish to model economic contributions at a state or national level, rather than confining to local regions.

It is possible, however, to estimate the economic contribution at two or three geographic levels (e.g. region, state and national levels) but the data collection becomes more complex (and potentially more onerous for some data providers) and the modelling, analysis and reporting tasks all increase accordingly.

Answer:

- Local/Regional: _____
- State: _____
- National

2.5. Which economic contribution indicators are important?

A clear study purpose will assist in determining which economic contribution indicators to include in the study. For example, is the study only wanting to value the direct output of each stage? Or is the economic contribution (gross regional product and employment) a more important consideration? Are upstream (flow-on) contributions required?

Answer:

- Value/revenue only
- Direct economic contribution indicators (such as employment, household income and gross regional product)
- Total economic contribution indicators (including direct and flow-on effects).

2.6. Specifying the approach

Guidelines are informed by recommendations in the second output in the study *Valuing WA Smaller Commercial Fisheries Across the Supply Chain (FRDC Project: 2022-038): Draft Report* (BDO EconSearch 2023). The study made three separate estimates of the economic contribution of a selection of case study fishery supply chains using three different levels of information. It then compared the sets of results for each case study to make conclusions about the quality versus cost of the approaches. Case study fisheries were also compared within each approach to draw conclusions about how different types of supply chains influence these recommendations. The three approaches were:

- Approach 1 (minimal cost): published fishery production data and published national input-output (IO) profiles that describes inter-sector flows
- Approach 2 (minimal consultation): the same as Approach 1 but also including a workshop with key stakeholders to inform the flows and margins
- Approach 3 (maximum data): the same as Approach 2 but also collecting primary data from businesses along the supply chain.

The **recommendations** which inform these guidelines are:

1. We have very little confidence in Approach 1 and do not recommend its use in the context explored by this study as:
 - Small scale fishery supply chains are generally not well represented by average national statistics (we suspect that they underestimate economic contribution in this context).
 - Approach 1 results are very different to Approach 3 (with which we have higher confidence).
2. Approach 2 and 3 are each workable, with the preferred approach depending on the fishery and research context:
 - If fishery businesses are reluctant to share data then Approach 3 may be preferred as there is a risk that workshops will fail
 - If the supply chain is highly complex, such as including multiple species and products, each materially important, then Approach 3 may be preferred as there is a risk of not capturing sufficient information at a workshop
 - If higher quality information is particularly valuable (i.e. the cost is considered affordable) then Approach 3 may be preferred
 - Otherwise, Approach 2 is likely to be sufficient.

3. Approach 2 is likely to be preferred in most fisheries with some exceptions made due to the above factors.
4. Have knowledgeable people, with a combined view of most of the supply chain, involved and attending workshops. This is critical to the success of Approach 2 and should include people representing seafood processing and food service, if possible.
5. Where Approach 2 is undertaken, we recommend that a few follow up interviews are undertaken as they are likely to add substantial value to the workshop approach. These interviews can be quick 'fact checks' with people recommended by workshop attendees, or can capture anyone who failed to attend a planned workshop. Follow-up interviews are a second-best compared with including the right people in the workshop to begin with.

As such, there are two approaches we will refer to henceforth in these guidelines:

- **Minimal consultation approach** uses published fishery production data and published national input-output (IO) profiles that describes inter-sector flows but also including a workshop with key stakeholders to inform the assumptions.
- **In-depth consultation approach** builds on the minimal consultation approach but additionally includes the collection of primary data from businesses along the supply chain through interviews.

Provided below is a table to assist the decision maker using the answers in the above sections. The most appropriate method is likely to be the one identified by the column into which most of your answers fall.

Table 2-2 Study scoping table

Study scoping aspect	Minimal consultation approach	In-depth consultation approach
Which fisheries?		
How many fisheries?	<ul style="list-style-type: none"> • Many 	<ul style="list-style-type: none"> • One • A few
Large or small fisheries? ^a	<ul style="list-style-type: none"> • Small 	<ul style="list-style-type: none"> • Small
Simple or complex fisheries and supply chains?	<ul style="list-style-type: none"> • Very simple • Mostly simple 	<ul style="list-style-type: none"> • Complex
Are businesses in the fishery supply chain reluctant to share data?	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • Yes
Which parts of the supply chain?	<ul style="list-style-type: none"> • Fishing and harvesting • Processing and wholesaling 	<ul style="list-style-type: none"> • All the way to consumers (including retailing and food service)
What region?	<ul style="list-style-type: none"> • State • National 	<ul style="list-style-type: none"> • Local
What economic indicators are important?	<ul style="list-style-type: none"> • Value • Direct economic contribution indicators 	<ul style="list-style-type: none"> • Total economic contribution indicators

^a The approaches have only been tested on small scale fisheries.

3. DATA REQUIREMENTS AND COLLECTION

This section describes the data requirements to undertake a small scale fishery supply chain economic contribution analysis. More detailed guidelines about how to practically collect these data are also provided. As described in Section 2.6, there are two possible approaches we recommend to estimate the economic contribution of a small scale fishery’s supply chain:

- Minimal consultation approach
- In-depth consultation approach.

3.1. Data types

The main data items required for each approach are summarised in Table 3-1, with further detail on what data are required, how to collect it and whether it is required for each approach in the sections below.

Table 3-1 Data sources for each approach

Data items	Minimal consultation approach	In-depth data approach ^a
Fishery production statistics	Published production statistics	
Fishery financials and employment	Published national input-output (IO) profiles (ABS 2022)	Primary data from workshop and/or survey/interview
Supply chain flows	Estimated by workshop with stakeholders, starting from IO table estimates.	Primary data from workshop or survey/interview
Supply chain financials and employment	Published national IO profiles (ABS 2022)	Primary data from workshop or survey/interview

^a It may be necessary to fill some data gaps with information from the lower level approach.

3.1.1. Fishery production statistics

What data:

- volume of catch
- gross value of production (GVP)
- average beach price.

GVP refers to the value of the total annual catch for individual fisheries, fishing sectors or the fishing industry as a whole, and is measured in dollar terms. *GVP*, generally reported on an annual basis, is the quantity of catch for the year multiplied by landed beach prices.

Beach price refers to the price received by commercial fishers at the ‘port level’ for their catch, and is generally expressed in terms of \$/kg. Some processing costs are included in the beach price, as some processing occurs on the boat. Other processing costs are not included in the beach price, as processing operations are assumed to occur further along the value chain. The use of beach prices also removes the effect of transfer pricing by the firm if it is vertically integrated into the value chain.

Who holds it:

For State managed fisheries these data are generally held by the relevant State Government fisheries department.

For Commonwealth managed fisheries these data are held by Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).

How to access it:

Publicly available or by special request

These data are required regardless of whether you choose the minimal consultation approach or the in-depth consultation approach.

3.1.2. Fishery financials and employment

Minimal consultation approach

What data:

Published national input-output (IO) profiles.

Who holds it:

Australia Bureau of Statistics (ABS)

How to access it:

<https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/latest-release>

In-depth consultation approach

What data:

- Business revenue
- Employment
- Wages and salaries
- Other business costs
- Capital expenditure
- Production (type, price and destinations).

Who holds it:

Fishing businesses

How to access it:

Interviews with businesses using the business template in Appendix 2. Further description of the interview process is provided in Section 3.2.4.

3.1.3. Supply chain flows

What data:

- Seafood input (volume, average cost and source(s)) (for businesses downstream of fishing).
- Seafood sales (volume, average price and source(s))

Who holds it:

Supply chain businesses

How to access it:

Workshops with key stakeholders. Further description of the workshop process is provided in Section 3.2.3.

These data are required regardless of whether you choose the minimal consultation approach or the in-depth consultation approach.

3.1.4. Supply chain financials and employment

Minimal consultation approach

What data:

Published national input-output (IO) profiles.

Who holds it:

Australia Bureau of Statistics (ABS)

How to access it:

<https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/latest-release>

In-depth consultation approach

What data:

- Business revenue
- Employment
- Wages and salaries
- Seafood input costs
- Other business costs
- Capital expenditure
- Production (type, price and destinations)

Who holds it:

Supply chain businesses.

How to access it:

Interviews with businesses. Further description of the interview process is provided in Section 3.2.4.

3.2. Data collection

Different data collection methods are required for the various data types described in Section 3.1. These are described further below.

3.2.1. Production

For State managed fisheries these data are generally held by the relevant State Government fisheries department. Some data may be publicly available, and some may need to be accessed by special request.

For Commonwealth managed fisheries these data are held by Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). Any data available for publication (non-confidential data) will be available via their website: <https://www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-data>.

3.2.2. Economic

Published national input-output (IO) profiles from the Australia Bureau of Statistics (ABS) can be accessed via <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/latest-release>

The following tables should be used:

- Table 8: Industry by industry flow table (indirect allocation of imports)
- Table 9: Direct requirements coefficients (indirect allocation of imports)
- Table 20: Employment by industry
- Table 23: Wholesale margin on supply by product group by using industry and final use category
- Table 23: Retail margin on supply by product group by using industry and final use category.

3.2.3. Workshops

Who: Key supply chain stakeholders, preferably one from each node (fishing, processing, wholesaling, retailing and food service).

Method: Face-to-face or online workshop where attendees can view a supply chain map, and facilitators can draw/modify a supply chain map.

Arrangement and briefing: Arrange a time when everyone can attend and provide a briefing document with the workshop agenda. See Appendix 1 for a workshop briefing document template.

Implementation:

1. Introduce the study and workshop (refer to indicative supply chain map in the briefing document)
2. Open discussion about the fishery's supply chain
3. Draw a supply chain on-screen with guidance from all. An example is provided in Figure 4-1.
4. Open discussion of gaps, uncertainties and any other issues with the drawn supply chain
5. Next steps: A chance for participants to provide further comments and discussion following the workshop.

3.2.4. Interviews

Who: Key supply chain stakeholders, preferably 2-3 from each node (fishing, processing, wholesaling, retailing and food service)

Method: face-to-face, online or telephone interviews

Implementation and data collection: Arrange a time for the interview and use the business interview template (see Appendix 2).

4. MODELLING PROCESS

This section documents some of the key modelling considerations in undertaking a small scale fishery supply chain economic contribution analysis, including economic modelling framework, components of total economic contributions, use of multipliers and attribution of economic activity to regions. This section has been prepared for use by practitioners (researchers, consultants, government analysts) who have knowledge and understanding of economic contribution methodology. Some parts of this section are, therefore, quite technical.

4.1. Supply chain value modelling

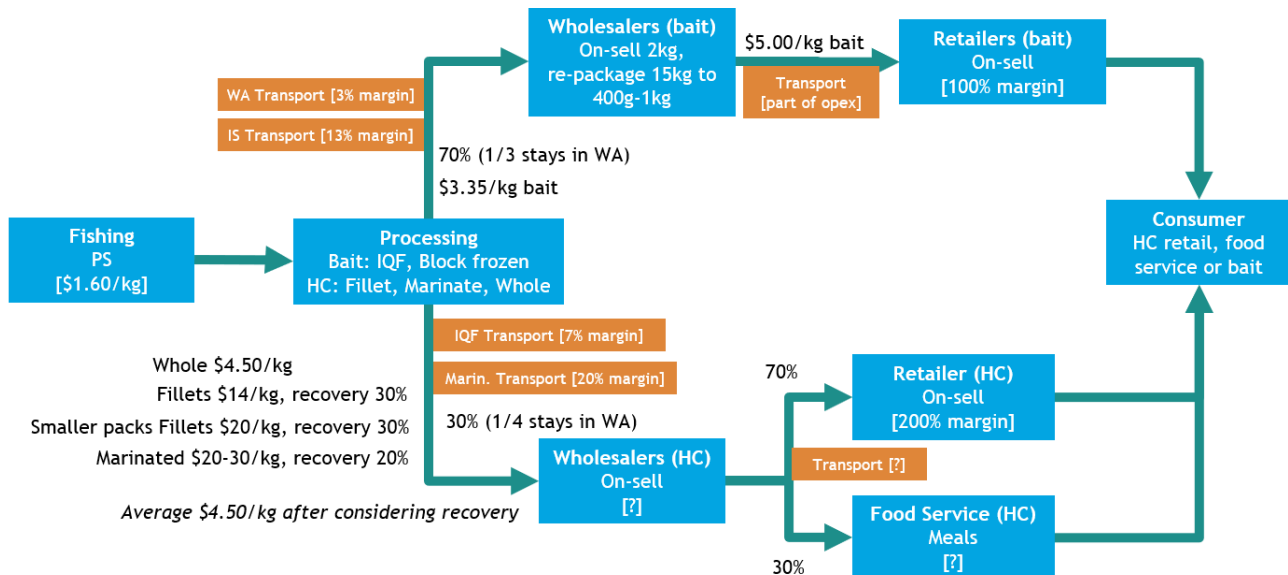
The first step in the modelling process is to construct a spreadsheet (e.g. Excel) model of a fishery supply chain and then to model the supply chain flow information gathered through the workshops.

Supply chain flows

The results of the workshops should be used to estimate the flows of the product to each supply chain node, including the associated recovery rate. An example supply chain flow map is shown in Figure 4-1. Some key points to aid understanding of the map are:

- Blue boxes are stages in the supply chain. The box includes a name, description and information about the margin or price in square brackets.
- Green arrows are the flows of product between stages of the supply chain. The % numbers along the green arrows represent the % of sales value from a stage.
- Orange boxes identify transport margins and specify their value as a % of product value.

Figure 4-1 Example supply chain flow map, WA South Coast Purse Seine Fishery



Source: BDO EconSearch analysis and fishery workshop

Production characteristics of supply chain business activities

IO tables for a region report the sales from each industry to each other industry, as well as the purchases from each industry from each other industry. For example, they report sales from the fishing sector to the

seafood processing sector and other sectors. Subsequently, those sectors also have sales to other sectors. By applying these flows in sequence we can estimate the transfers between some nodes of a supply chain as well as the value-added and employment associated with those flows.

The Australian Bureau of Statistics (ABS) Australian National Accounts for the most recent available financial year (ABS 2022) can be used for this purpose using national averages. For fishing sectors, this means fishing activity from all fisheries and regions in Australia is being used. For other supply chain stages, we also incorporate aquaculture and imported seafood products into our averages.

An important consideration in using IO tables for this purpose is whether or not supply chain sectors (beyond the initial production sector) are defined as margin sectors (i.e. the *cost of goods sold* has been excluded from revenue and expenditure) in the IO table. This avoids double counting of purchases of seafood along the supply chain. For example, the value of a fish sold in a retail fish shop is based upon the value of the fish sold by the commercial fisher plus the value sold by the fish processor and the wholesaler. However, if we sum the total sale value at each stage we would be counting the value of the fish multiple times. Therefore, for each stage of the supply chain beyond the initial production stage, only the margin should be added to the value of the subsequent stage.

Key to the minimal consultation approach estimates of margins at each stage of the supply chain for each fishery, is the application of production functions of business activities from various IO tables in the ABS Australian National Accounts (ABS 2022). The relevant input-output industry groups (IOIG) and corresponding ANZSIC classes involving seafood are detailed in Table 2-1.

Some sectors, by nature of what they sell or the service they provide, are accounted for in the IO framework as margin sectors. Production characteristics can be taken directly from the IO tables for these sectors. However, for most sectors this is not the case and for them to be represented appropriately for supply chain analysis they need to be transformed into margin sectors. For the sectors analysed in the minimal consultation approach, this requires transformation only for the processed seafood manufacturing sector. To do so, the value of seafood purchases should be subtracted from the expenditures and revenue for the sector and the sector should then be re-expressed in terms of 'per dollar of seafood purchased', such as spending on intermediate sectors and primary inputs to production (compensation of employees (COE), gross operating surplus (GOS) and taxes less subsidies (TLS)). An example of a resulting supply chain margin for each sector is detailed in Table 4-2. The margin is the sum of the intermediate production (excluding seafood purchases for sectors beyond production), COE, GOS and TLS. Employment in full-time equivalent (FTE) terms from the IO tables was also re-expressed as employment per dollar of COE margin.

Table 4-2 Supply chain margins (per \$ of seafood use)

	Fishing, hunting & trapping ^a	Processed seafood manufacturing	Wholesale trade	Retail trade	Food & beverage service	Road transport
Seafood	-	1.00	1.00	1.00	1.00	-
Intermediate	0.51	0.28	0.15	0.08	1.03	0.58
COE	0.11	0.16	0.10	0.08	0.75	0.25
GOS	0.36	0.33	0.06	0.04	0.24	0.14
TLS	0.02	-0.01	0.00	0.00	-0.02	0.03
Margin ^b	-	0.77	0.31	0.20	2.00	-
Revenue^c	1.00	1.77	1.31	1.20	3.00	1.00
Employment (FTE/\$m COE)	25.61	19.07	11.35	18.89	26.18	15.61

^a Per dollar of revenue.

^b The margin is the sum of intermediate purchases, COE, GOS and TLS and excludes the initial value of seafood landed at supply chain nodes beyond fishing.

^c The revenue includes the initial value of seafood landed at supply chain nodes beyond fishing (i.e. the margin plus the seafood value).

Source: ABS 2022 and BDO EconSearch analysis

The margins detailed in Table 4-2 are expressed per dollar of seafood sold for each sector. For the fishing, hunting and trapping sector the margin can be expressed per dollar of seafood sold in the IO tables (ABS 2022), so no further transformation is required. For the processed seafood manufacturing sector this calculation is part of the transformation to a margin sector, as described earlier. For sectors that are already defined as margin sectors (retail trade, wholesale trade, food and beverage services) within the IO framework the margins need to be re-estimated. The retail trade and wholesale trade sectors margins can be estimated using retail and wholesale margin tables (ABS 2022) for sales by seafood processing to households. The food and beverage and transport sectors data are not available from the IO tables, so margins for these sectors need to be based on other research or best judgement.

The data received through the business interviews can be used to refine the supply chain analysis method used in the minimal consultation approach. The flows of the product to each supply chain node including the associated recovery rate can be revised in line with the business interview data. Where possible the margin at each node of the supply chain should also be revised, and the other modelling factors (intermediate, COE, GOS, TLS, revenue, and employment), adjusted depending on data availability using either the data from the business interviews or their proportional relationship with the margin established in the minimal consultation approach.

4.2. Economic contribution modelling

The recommended method employed for estimation of economic contributions is IO analysis. IO analysis is widely used in economic contribution analysis and is a practical method for measuring economic contributions at regional and state levels. Economic contribution indicators, defined in Table 4-1, can be reported by fishery by region.

By utilising the fishery GVP, supply chain flows and supply chain margins, a final demand shock can be calculated and used to 'shock' the IO model. Then the *General Approach* (Section 7.1 in FRDC and IMAS (2020)) can be applied from Step 10 onwards.

Table 4-1 Economic contribution indicators

Indicator	Reason	Interpretation/Calculation
Output	The total contribution of the fishery to the state economy	The gross revenue of goods and services produced by commercial organisations plus gross expenditure by government agencies. This indicator needs to be used with care as it includes elements of double counting.
Gross state product (GSP)	The net contribution of the fishery to the state economy.	The net contribution of an activity to the state/regional economy. Contribution to GSP is measured as value of output less the cost of goods and services (including imports) used in producing the output. It can also be measured as household income plus other value added (gross operating surplus and all taxes, less subsidies). It represents payments to the primary inputs of production (labour, capital and land). Using GSP as a measure of economic contribution avoids the problem of double counting that may arise from using value of output for this purpose.
Employment	The total employment contribution of the fishery to the state/regional economy.	The number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalent jobs.
Household income	A measure of the wages and salaries attributable to the employment contribution of the fishery.	A component of GSP and is a measure of wages and salaries, drawings by owner operators and other payments to labour including overtime payments and income tax, but excluding payroll tax.

4.3. Presentation and interpretation of results

As mentioned in FRDC and IMAS (2020) and it is worth reiterating here, there is a difference between economic contribution and economic impact. The terms are often used interchangeably but are actually different types of analyses. An economic impact analysis should be used when an industry is subject to some change or “shock” impacting revenues. Whereas economic contribution analysis provides a snapshot of an industry’s contribution to the economy at a point in time and provides a baseline to be tracked over time. These guidelines refer specifically to contribution analysis and should not be used to imply that all of this activity would necessarily be lost to the economy if fishing were to cease. That is an important consideration for the interpretation of the results.

An example of economic contribution fishery supply chain results are detailed in Table 4-2 for the WA South Coast Purse Seine Fishery for 2021/22 and some interpretation of the results is provided:

- GVP (direct fishing output) of the Fishery in 2021/22 was \$2.6m.
- The direct fishery contribution in 2021/22 was estimated to be \$1.4m in GSP, 13 fte jobs and \$0.8m in household income.
- The direct downstream contribution in 2021/22 (i.e. processing, wholesaling, retailing, food service and transport activities) was estimated to \$2.9m in GSP, 30 fte jobs and \$1.6m in household income.
- The total flow-on contribution in 2021/22 was estimated to be \$2.9m in GSP, 16 fte jobs and \$1.5m in household income.
- The total contribution in 2021/22 was estimated to be \$7.2m in GSP, 59 fte jobs and \$3.8m in household income.

Table 4-2 South Coast Purse Seine Fishery supply chain economic contribution, Approach 3, 2021/22 ^a

	Output (\$)	GSP (\$)	Employment (fte)	Household Income (\$)
Direct Fishing	2.6	1.4	13	0.8
Direct Downstream				
Processed Seafood Manufacturing	2.3	1.6	16	0.7
Wholesale Trade	0.5	0.5	2	0.2
Retail Trade	0.8	0.5	6	0.3
Food and Beverage Service	0.6	0.3	6	0.2
Export	0.0	0.0	0	0.0
Road Transport	0.3	0.1	0	0.1
Total Direct	7.1	4.3	43	2.4
Total Flow-on		2.9	16	1.5
Total Contribution		7.2	59	3.8

^a These results were generated using the in-depth consultation approach (Approach 3).

Source: BDO EconSearch analysis

As recommended in FRDC and IMAS (2020), the structure of a report for a seafood contributions study will be influenced by the terms of reference and by the requirements of the intended audience. However, the report should generally include:

- An executive summary that presents the main findings
- An overview of the seafood sector in question
- A clear description of the method used to estimate economic contribution and an explanation of what economic contribution analysis is
- A description of the purpose and intended audience(s) of the study, and of the scope of the analysis including the sectors and regions analysed
- A description of the major data and assumptions used in the study
- An overview of the process used to obtain multipliers (including the input-output tables and how they were modified)
- Separate estimates of the direct effects, flow-on effects and total contribution
- Disaggregated contribution estimates (as specified by the terms of reference)
- Information to facilitate the correct interpretation of results.

In many cases, a draft report should be circulated to key stakeholders for comment. This provides an opportunity to check the accuracy of the material presented and can help inform correct interpretation of the results.

REFERENCES

- Australian Bureau of Statistics (ABS) 2006, *Australian and New Zealand Standard Industrial Classification (ANZSIC)*, ABS Cat. No. 1292.0, Canberra.
- ABS 2022, *Australian National Accounts: Input-Output Tables, 2019-20*, ABS Cat. No. 5209.0, Canberra, August.
- BDO EconSearch 2023, *Valuing WA Smaller Commercial Fisheries Across the Supply Chain (FRDC Project: 2022-038): Draft Report*, a report prepared for FRDC (Project: 2022-038), June.
- FRDC and IMAS 2020, *Australian Fisheries and Aquaculture Industry 2017/18: Economic Contributions - Practitioner Guideline FRDC project 2017-210*.

Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

APPENDIX 1 Workshop Briefing Template

Project Title

Project Summary

Provide a brief summary of the project

Agenda

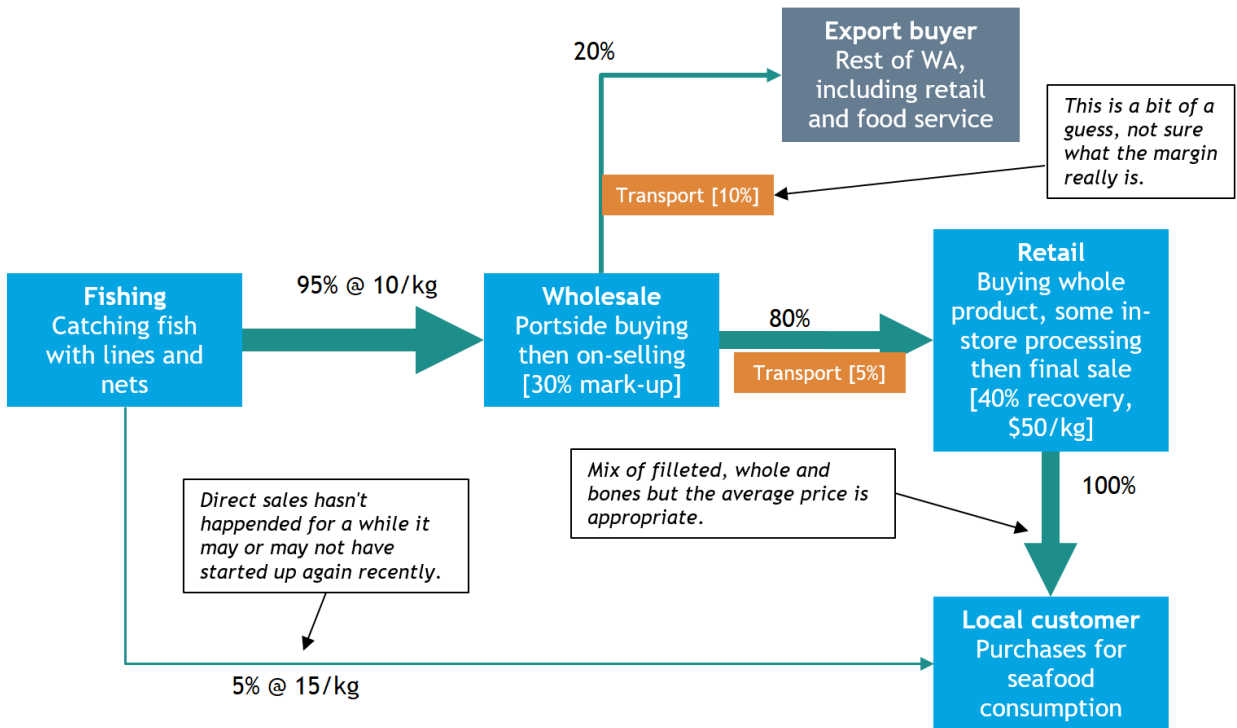
1. Introduce the study and workshop
(refer to indicative supply chain map on the next page)
2. Open discussion about the case study fishery's supply chain
3. Draw a supply chain on-screen with guidance from all
4. Open discussion of gaps, uncertainties and any other issues with the drawn supply chain
5. Next steps:
 - a. A chance for participants to provide further comments and discussion following the workshop.
 - b. Proceeding to 'on the ground survey'.

Indicative Supply Chain Map

Below is a simple and general supply chain map provided to demonstrate the type of output we aim to achieve from this workshop. We will draw a supply chain map like this in the workshop through discussion.

Key

- Blue boxes are stages in the supply chain. These may be separate businesses, different stages on a vertically integrated business, or a mix of both. The box includes a name, description and information about the margin or price in square brackets [].
- Grey boxes represent sales to buyers outside of the region (the region which will be described in the workshop).
- Green arrows are the flows of product between stages of the supply chain. Larger arrows represent larger flows.
- The % numbers represent the % of sales value from a stage. For example, *wholesale* earns 20% of its revenue from exports to rest of WA and 80% from sales to local *retail*.
- Orange boxes identify transport margins and specify their value as a % of product value.
- Black outline boxes show key gaps, uncertainties and other issues with the way the supply chain is drawn.



APPENDIX 2 Business Interview Template

Interview Template - FRDC Project 2022-038

Interviewer:		Interviewee:		Business name:		Date:		Place:		
Scope			Employment			Trends/Time context				
Time period	2021/22		Total jobs			Was 2021/22 an unusual year? How?				
Regions	Local, WA, Aus, OS		Location of jobs (see Regions)							
Activities	All catch from the fishery and all supply-chain activities to consumers.		FTE equiv.							
			Wages <i>e.g. average wage? share of catch?</i>							
			Describe unpaid labour							
Primary product input <i>Forms, suppliers (location), prices, quantities, values</i>			Business activities			Products (and by-products)				
			Location			Product	Value (\$)	Destinations		
			In-scope activities							
			Out of scope activities							
			What percentage of activity described on this sheet is in-scope? (OPEX, empl, etc)							
						TOTAL REVENUE (\$)				
Other OPEX			CAPEX in last 5 years					Profitability		
Item	Value (\$ or %)	Sources (see regions)	Item	Year	Value	Source (see regions)	% in scope	GOS=TR-TC		
Wages								... OR ...		
								Large profit	Small profit	
								Break even	Small loss	
								Large loss		
TOTAL COSTS (\$)				CAPEX plans in next 5 years?				Description of mark-ups or margins		



1300 138 991

www.bdo.com.au

NEW SOUTH WALES
NORTHERN TERRITORY
QUEENSLAND
SOUTH AUSTRALIA
TASMANIA
VICTORIA
WESTERN AUSTRALIA

AUDIT • TAX • ADVISORY

BDO Services Pty Ltd ABN 45 134 242 434 is a member of a national association of independent entities which are all members of BDO Australia Ltd ABN 77 050 110 275, an Australian company limited by guarantee. BDO Services Pty Ltd and BDO Australia Ltd are members of BDO International Ltd, a UK company limited by guarantee, and form part of the international BDO network of independent member firms. Liability limited by a scheme approved under Professional Standards Legislation.

