



**DATA NEEDS AND DATA
AVAILABILITY FOR A NATIONAL
CONTRIBUTIONS STUDY
WORKING PAPER 2**

A report to The University of
Tasmania and Fisheries Research and
Development Corporation

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ABBREVIATIONS

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
AFMA	Australian Fisheries Management Authority
DPIPWE	Department of Primary Industries, Parks, Water and Environment
BCI	boat cash income
FRDC	Fisheries Research and Development Corporation
fte	full-time equivalent
GOS	gross operating surplus
GRP	gross regional product
GDP	gross domestic product
GVP	gross value of production
HDR	Human Dimensions Research
IMAS	Institute for Marine and Antarctic Studies
MEY	maximum economic yield
NCP	National Contributions Project
NER	net economic return
NSW	New South Wales
NSWDPI	New South Wales Department of Primary Industries
NT	Northern Territory
NTDPIR	Northern Territory Department of Primary Industries and Resources
PIRSA	Primary Industries and Regions South Australia
QDAF	Queensland Department of Agriculture and Fisheries
ROI	return on investment
SA	South Australia
SARDI	South Australian Research and Development Institute
SIA	Seafood Industry Australia
TAS	Tasmania
TBCC	total boat cash costs
VIC	Victoria
VFA	Victorian Fisheries Authority
WA	Western Australia
WAPIRD	Western Australia Primary Industries and Regional Development

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1. INTRODUCTION

1.1. Background

Discussions between Seafood Industry Australia (SIA) and Fisheries Research and Development Corporation (FRDC) have identified the need to gather the information required to support the Australian fisheries and aquaculture industry to “tell its story” of its contributions to the national, state and regional economies and communities. FRDC’s Human Dimensions Research (HDR) Subprogram will address this need by leading a National Contributions Project (NCP) which will:

Provide an estimate of the economic contribution of wildcatch fisheries and aquaculture to the Australian (national) economy, and of the economic contribution of jurisdictionally-based (State, Territory and Commonwealth) fisheries and aquaculture sectors make to their State/Territory economies

Provide measures of the range of social and economic contributions made by specific, selected fisheries/aquaculture sectors at the regional or product scale

Develop a robust and nationally-consistent framework to support data collection and estimation of contributions in the future.

The design of the research program to be coordinated by the NCP requires a comprehensive technical review of existing contribution studies and data to ensure that it avoids duplication by building on previous work and data collection/analysis. Such a review will also help ensure that best-practice methods are used to estimate contributions, given data requirements and budget.

The review will comprise three Parts:

What fisheries and aquaculture economic contribution studies have been conducted in the past 10 years in Australia and what elements of this body of work can be used (with or without adjustment) in the NCP?

What data are needed to support NCP objective 1 and what data are currently available for use in this project?

What are the implications of 1 and 2 for the design of the NCP?

Part 1 of the review was the subject of Working Paper 1 (WP1). It identified and critically assessed all the recent contributions reports. The list of reports reviewed was compiled through a search of the academic literature and direct contact with agencies, peak bodies, FRDC, RACs and IPAs.

Part 2 of the review is the subject of this paper, Working Paper 2 (WP2). The aim of this paper is to identify and audit existing data sets that can be used to support NCP objective 1, and to identify data gaps. The process of identifying available data is summarised in Section 1.2 below.

Part 3 of the review will be the subject of Working Paper 3 (WP3). It will provide preliminary recommendations about the preferred research design for NCP objective 1, including scope, method, data requirements and data collection plan. These will be considered and refined by the Technical Working Group prior to being presented at a Stakeholder Workshop.

1.2. Preparation of Working Paper 2

The process of identifying available data draws on the output of Part 1 and has involved direct communication with key data managers/custodians in each of the jurisdictions. In addition to the helpful

input from members of the Technical Advisory Group, we would also like to acknowledge the responses and suggestions from staff at the following agencies and organisations:

- Australian Bureau of Agricultural Resource Economics and Sciences
- Australian Fisheries Management Authority
- New South Wales Department of Primary Industries
- Northern Territory Department of Primary Industries and Resources
- Northern Territory Seafood Council
- Queensland Department of Agriculture and Fisheries
- South Australian Department of Primary Industries and Regions
- Tasmanian Department of Primary Industries, Parks, Water and Environment
- University of Tasmania
- Victorian Fisheries Authority
- Western Australia Department of Primary Industries and Regional Development.

Section 2 of this report considers the data needs for an economic contributions analysis. The data required of a contributions analysis is often collected and used for other economic analysis purposes, particularly for the development and implementation of harvest strategies. Drawing on a report prepared for the Seafood CRC and FRDC, Section 2 details the range of relevant data sets that can be compiled for such purposes (financial data, economic efficiency data and economic contributions data).

In Section 3 the fisheries and aquaculture data currently available to help prepare a contributions assessment in Australia are detailed and gaps identified. This information is presented separately for fisheries in each of the states, the Northern Territory and those managed by the Commonwealth.

2. DATA NEEDS

To fully assess the data needs for an economic contributions analysis, it is worthwhile considering the range of economic data and economic indicators that could be compiled. As well as providing information about the contribution that commercial fisheries and aquaculture make to the economy, economic data that would be compiled in preparing a contributions analysis can also provide useful information in the development and implementation of harvest strategies and in decision making processes that aim to achieve maximum returns to the fishery (e.g. maximum economic yield (MEY)).

Relevant economic data sets can be grouped as follows:

- financial data
- economic efficiency data
- economic contribution data.

2.1. Financial Data

Financial data are data that have a direct bearing on the financial performance of vessels in the fishery or businesses in an aquaculture sector. Financial data are used as input into economic contributions models but can also be used as input into bioeconomic or other models used to estimate MEY in commercial fisheries, for example.

Primarily, the financial data will be those that are relevant to operators of fishing vessels and aquaculture enterprises. For these commercial businesses the principal objective will generally be to maximise returns to their investments. For this reason, the costs and returns to the business are of primary importance.

The main financial data considered here are:

- product prices and income
- operating costs
- business profitability.

2.1.1. Product prices and income

Product price is an obvious data need for a contributions analysis and an important determinant in calculating a number of related economic indicators (e.g. gross value of production, value of exports and business profitability).

For wild catch fisheries, the reference price is generally the *beach price*. This refers to the price received by commercial fishers at the 'port level' for their catch, and is usually expressed in terms of \$/kg. 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.

Similarly, for the aquaculture sector, the reference price is generally the *farm gate price*. This refers to the price received by aquaculture operators at the 'farm gate level' for their production and, like commercial fisheries, it excludes processing operations and is usually expressed in terms of \$/kg.

Because the indirect measures of economic contribution (i.e. the flow-on or multiplier effects) depend on estimates of expenditures by the fishing and aquaculture businesses, it is important that expenditure data relates to the income generated by that expenditure.

The approach taken in the preparation of economic indicators by ABARES for major AFMA managed fisheries (e.g. Mobsby and Bath 2018) and that taken by EconSearch for PIRSA managed fisheries (e.g. EconSearch 2018a) is slightly different with regard to the scope of income and costs. In preparing fisheries financial indicators ABARES includes all income, costs and capital associated with the fishing business, including in cases where fishing businesses have operated in a number of fisheries. By contrast EconSearch only considers income from the fishery under consideration, related costs and the share of capital employed in that fishery. Both approaches are valid, with the ABARES approach being more appropriate in fisheries where there is significant employment of capital in other fisheries (e.g. the Northern Prawn Fishery, where most businesses operate in other state-based prawn or trawl fisheries). The EconSearch approach is more appropriate where most fishing businesses operate discretely within individual fisheries and where a comparison of financial performance across fisheries is desired. The main consideration is to keep to one method, otherwise boat profitability, economic contribution and any other indicators estimated using the data will be under or over-estimated.

The ABARES financial indicator for enterprise income is *Total Cash Receipts*. Total cash receipts represent returns from the sale of fish, from non-fishing activities, including charter operations, and from other sources (insurance claims and compensation, quota and/or endorsements leased out, government assistance and any other revenue) in the financial year (Skirtun 2014). For consistency, marketing charges may need to be added back into fishing receipts for some boats to give a gross value. Where this is necessary, these selling costs are also added into the cost estimates to offset the new revenue figure. Receipts also include amounts received in the survey year for fish sold in previous years (Skirtun 2014).

The EconSearch financial indicator for income is *Total Boat Income*. Total boat income refers to the cash receipts for fishing received by an individual firm and is expressed in dollar terms. Total boat income is generally calculated as catch (kg) multiplied by 'beach price' (\$/kg). In the case of the charter boat sector, total boat income is calculated as number of clients multiplied by average price (\$/person). Total boat income is the contribution of an individual licence holder to the GVP of a fishing sector or fishery.

If a significant proportion of the catch from the fishery is exported, the value of the Australian dollar relative to the trading currency can have a considerable impact on the economic performance of the fishery, and exchange rate data are useful to collect as well.

2.1.2. Business operating costs

Detailed business operating costs (fuel, labour, repairs and maintenance, provisions, etc.) are useful indicators of economic contribution in their own right but are also important in calculating contribution of the fishery to the regional/state/national economy (as well as other indicators such as business profitability and fishery resource rents).

The preferred approach to collecting a comprehensive set of fishing and aquaculture production costs is through a direct survey of fishing and aquaculture businesses. For commercial fisheries some costs, or at least indicators of the main costs, can be estimated from readily available sources and used as proxies for actual vessel operating costs. Section 2.1.3 overviews two such approaches to cost (and profit) estimation when a survey is not possible.

Fishing industry surveys to collect financial data are conducted regularly by ABARES for Commonwealth managed fisheries and by EconSearch for South Australian managed fisheries. The remainder of this section overviews the different categories of cost data collected in those surveys.

ABARES estimates *Total Cash Costs*. Total cash costs include payments made for both permanent and casual hired labour and payments for materials and services (including payments on capital items subject to leasing, rent, interest, licence fees and repairs and maintenance). Capital and household expenditures are excluded (Skirtun 2014).

Labour costs are often the highest cash cost in the fishing operation. Labour costs include wages and an estimated value for owner/partner, family and unpaid labour. Labour costs cover the cost of labour involved in boat-related aspects of the fishing business, such as crew or onshore administration costs, but do not cover the cost of onshore labour involved in processing fisheries products. On many boats, the costs of labour are reflected in the wages paid by boat owners and/or in the share of the catch they earn. However, in some cases, such as where owner-skippers are involved, or where family members work in the fishing operation, the payments made can be low or even nil, which will not always reflect the market value (opportunity cost) of the labour provided. To allow for this possible underestimation, all owner/partner and family labour costs are based on estimates collected at the interview of what it would cost to employ someone else to do the work (Skirtun 2014).

EconSearch's approach in terms of cost items under consideration is the same, however the costs are split into variable and fixed costs.

Total Boat Variable Costs: are costs which are dependent upon the level of catch or, more commonly, the amount of time spent fishing. As catch or fishing time increases, variable costs also increase. Variable costs are measured in current dollar terms and include the following individual cost items:

- fuel, oil and grease for the boat (net of diesel fuel rebate)
- bait
- ice
- provisions
- crew payments
- fishing equipment, purchase and repairs (nets, pots, lines, etc.)
- repairs & maintenance: ongoing (slipping, painting, overhaul motor).¹

Total Boat Fixed Costs: are costs that remain fixed regardless of the level of catch or the amount of time spent fishing. As such these costs, measured in current dollar terms, are likely to remain relatively constant from one year to the next. Examples of fixed cost include:

¹ Some components of repairs and maintenance may be better classified as fixed costs (e.g. regulated maintenance). If operating costs are separated into fixed and variable categories then it is desirable to separate repairs and maintenance similarly, where possible.

- insurance
- licence and industry fees
- office & business administration (communication, stationery, accountancy fees)
- interest on loan repayments and overdraft
- leasing.

Total Boat Cash Costs (TBCC): defined as Total Boat Variable Costs plus Total Boat Fixed Costs.

Like the ABARES method, the EconSearch approach estimates a value for *Owner-operator and Unpaid Family Labour*. This imputed labour cost can be included simply as another cost so that Gross Operating Surplus takes account of this cost. Alternatively, it can be deducted from GOS to give a separate indicator called Boat Cash Income (Section 2.1.3 provides a description of GOS and BCI). Owner-operator and unpaid family labour is separated into variable labour (fishing and repairs and maintenance) and overhead labour (management and administration).

2.1.3. Methods to estimate vessel operating costs

For most fisheries in most jurisdictions catch, price and revenue information is readily available (see Section 3). However, information on the costs of fishing is often difficult to obtain without a dedicated and customised survey. Fishers are often reluctant to participate in voluntary surveys to provide detailed information on their individual financial situation (Pascoe 2008) and in any case a representative fisher survey for all fisheries of interest is often beyond the scope of economic studies, including contributions studies.

As noted in Section 2.1.2 an alternative to a licence holder survey is to impute cost data. Two examples of such imputation are:

- a method developed by Zhou et al. (2013) in their Fisheries Research and Development Corporation report: *Quantitatively defining biological and economic reference points in data poor fisheries*. This method utilises econometrically estimated equations developed using ABARES and EconSearch data; and
- a method developed to support the analysis of the NSW commercial fisheries reform package (AgEconPlus Consulting et al. 2015). Under this method, operating expenditure for an average active fishing business in each fishery was imputed by aligning cost data extracted from economic indicator studies undertaken by EconSearch in South Australia to relevant NSW share class fisheries, with appropriate adjustments for days fished and other comparable information.

Zhou et al. (2013) used economic data from a wide range of fisheries (both Commonwealth and South Australian) to derive simple relationship between the costs of fishing and the type of fishing activity. The key cost components that were modelled were variable costs (separated into fuel and oil, crew, freight and marketing and other variable costs), quasi-fixed costs (including repairs and maintenance), fixed costs and capital and depreciation costs. Estimates of most cost components can be imputed based on average size

of vessels, their main fishing gears², the number days fished and the type of management under which vessels operate.

As noted above, catch and revenue estimates are available for most fisheries, however cost data imputed from Zhou et al. (2013) is on a vessel or business basis which may be utilised in other fisheries. Consequently, to estimate ROI and other measures of profitability for an average vessel or fishing business in a particular fishery, fixed costs, depreciation and value of capital can be apportioned based on the days the vessel spent in the subject fishery compared the total number of days fishing³.

The second approach (AgEconPlus et al 2015) involved aligning cost data extracted from the SA survey-based economic indicator studies undertaken by EconSearch to the relevant NSW fisheries, with appropriate adjustments for days fished and other comparable information. Each of the NSW fisheries was “matched” to a SA fishery with similar characteristics for which detailed fishing costs were known.

The known costs in the SA fisheries were adjusted according to a range of factors that were known in both the SA and NSW fisheries. These included

- days fished
- days fished in fishery as a proportion total days fished (estimated based on boat registration and average days fished per fishery details)
- number of active vessels
- average boat length
- catch
- revenue in fishery.

These data together with detailed per boat cost data for the “matching” SA fishery were used to derive the cost structures for each commercial fishery. Individual costs were estimated using relevant data as follows:

- Fuel costs - % of days fished & boat length adjustment
- Crew costs - % revenue
- Freight costs - % catch
- Other variable costs - % of days fished & boat length adjustment
- Repairs and maintenance - % of days fished & boat length adjustment
- Other fixed costs - % of days in fishery & boat length adjustment
- Vessel capital - % of days in fishery & boat length adjustment

² Most fishers use multiple types of fishing gear and there is heterogeneity across fishers. However, application of the CSIRO modelled required selection of the main fishing gear or approach.

³ Of course this depends upon accurate reporting of days fished in each of the fisheries in which the vessel/business operates.

- Depreciation - % depreciation rate from “matched fishery”
- Employment - ratio of employment (total and fte) to GVP from “matched fishery”.

2.1.4. Business profitability

Estimating business profitability is critical in any contributions study as it comprises an important component of an industry’s direct contribution to gross domestic product. In general terms, this can be measured for an individual industry, or a firm within that industry, as gross operating surplus *plus* wages, salaries and supplements *plus* indirect taxes *less* subsidies.

As with any business, there are a number of ways to measure fishing boat profitability, which are discussed below. As is the case with vessel operating costs, the measures of vessel profitability can only be effectively collected via a survey of concession holders.

In addition to operating costs, information is required on depreciation of all capital items and any labour costs that are not part of normal operating costs (such as the boat owner and family members who are not paid a regular wage).

These indicators are on a per vessel basis. The data set would allow ready calculation of profitability in terms of other units, e.g. gross margin/tonne, EBIT⁴/tonne.

EconSearch uses the following profitability indicators:

Boat Gross Margin: is defined as Total Boat Income less Total Boat Variable Costs. This is a basic measure of profit which assumes that capital has no alternative use and that as fishing activity (days fished) varies there is no change in capital or fixed costs.

Gross Operating Surplus: (GOS) is defined as *Total Boat Income* less *Total Boat Cash Costs* and is expressed in current dollar terms. GOS may be used interchangeably with the term *Gross Boat Profit*. A GOS value of zero represents a breakeven position for the business, where TBCC equals TBCR. If GOS is a negative value the firm is operating at a cash loss and if positive the firm is making a cash profit. GOS does not include a value for owner/operator wages, unpaid family work, or depreciation.

Boat Cash Income: is defined as *Gross Operating Surplus* less *imputed wages for owner- operator and unpaid family labour*.

Boat Capital: includes capital items that are required by the licence holder to earn the boat income. It includes boat hull, engine, electronics and other permanent fixtures and tender boats. Other capital items such as motor vehicles, sheds, cold-rooms, and jetty/moorings can be included to the extent that they are used in the fishing business. The fishing licence/permit value is included in **Total Boat Capital**.

Depreciation: Depreciation refers to the annual reduction in the value of boat capital due to general wear and tear or the reduction in value of an item over time.

⁴ Earnings before interest and tax.

Boat Business Profit: is defined as *GOS less Depreciation less Owner-operator and Unpaid Family Labour*. Boat Business Profit represents a more complete picture of the actual financial status of an individual firm, compared with GOS, which represents the cash in-cash out situation only.

Profit at Full Equity: is calculated as *Boat Business Profit plus rent, interest and lease payments*. Profit at Full Equity represents the profitability of an individual licence holder, assuming the licence holder has full equity in the operation, i.e. there is no outstanding debt associated with the investment in boat capital. Profit at Full Equity is a useful absolute measure of the economic performance of fishing firms.

Rate of Return to Capital: is calculated as *Profit at Full Equity* divided by *Boat Capital* multiplied by *100*. This measure is expressed in percentage terms and is calculated for an individual licence holder. It can be estimated as two indicators: rate of return to boat capital (fishing gear and equipment) and rate of return to total boat capital (fishing gear, equipment, quota and licence). It refers to the economic return to the total investment in capital items, and is a useful relative measure of the performance of individual firms. Rate of return to capital is useful to compare the performance of various licence holders, and to compare the performance of other types of operators, and with other industries.

ABARES reports a subset of the above indicators, namely boat cash income, boat business profit, profit at full equity, rate of return to boat capital and rate of return to full equity (equivalent to rate of return to total boat capital).

2.2. Economic Indicators

In addition to ensuring that the exploitation of fisheries and aquaculture resources is conducted in a manner consistent with the principles of ecologically sustainable development, the charter for most agencies responsible for fisheries and aquaculture sector management will generally be concerned with:

- maximising economic efficiency in the exploitation of fisheries resources
- implementing efficient and cost-effective fisheries management.

These broader considerations give rise to a number of indicators additional to those referred to in Section 2.1. These include:

- gross value of production
- cost of management
- economic rent or net economic return (NER).

2.2.1. Gross value of production

GVP is a commonly reported indicator of economic contribution and is used in the calculation of a number of other economic indicators.

Gross value of production (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. Similarly, for aquaculture sectors GVP refers to the value of total annual production of individual sectors or the aquaculture industry as a whole. GVP, generally reported on an annual basis, is the quantity of catch or production for the year multiplied by the average monthly landed beach prices in the case of fisheries and farm gate prices for the aquaculture industry. GVP is generally reported with the two components from which it is derived, namely average price and catch.

2.2.2. Cost of management

An objective of many jurisdictions is to achieve recovery of the costs of the agency or authority responsible for the management of the jurisdiction's fisheries and aquaculture leases. Because the management of the resource benefits the resource users, a strong argument can be made that the users should contribute to the cost of management.

In both commercial fisheries and aquaculture sectors, management services will generally include biological monitoring and reporting; policy, regulation and legislation development; compliance and enforcement services; licensing services; and research. Where a commercial fishery or aquaculture sector operates under full cost recovery, licence fees will be set to cover the cost of managing the fishery/aquaculture sector or at least the commercial sector's share of the resource.

In fisheries and aquaculture sectors where there is full cost recovery, it can be assumed that the cost of providing these management services to the commercial sector will be equal to the gross receipts from licence fees in the fishery/aquaculture sector. With information on licence fee receipts, GVP, catch and the number of commercial fishers in the fishery, the following indicators can be readily calculated:

- aggregate licence fee receipts for the fishery (or aquaculture sector) (\$)
- licence fee/GVP (%)
- licence fee/catch (or /production) (\$/kg)
- licence fee/licence holder (\$/licence holder).

In fisheries without full cost recovery it is appropriate to estimate both the recovered management costs (i.e. licence fees and other recovered costs) and non-recovered management costs and to present the above indicators in terms of total management costs (i.e. recovered management costs plus non-recovered management costs).

Whether management costs are recovered through licence fees wholly, partially or not at all, it is important that the total management costs be captured in an economic contributions study as they can comprise an important part of the economic activity associated with a commercial fishery or aquaculture sector. In South Australia, for example, where there is a policy of full cost recovery, fishery management costs ranged between 2.7 (Spencer Gulf Prawn fishery) and 11.0 per cent (Marine Scalefish fishery) of GVP in 2016/17, with an average of 4.8 per cent across all commercial fisheries.

2.2.3. Net economic return

Net economic return is also known as economic rent. It is defined as the difference between the price of a good produced using a natural resource and the costs of turning that natural resource into the good. In this case the natural resource is the fishery (or the utilised marine environment in the cast of aquaculture) and the good produced is the landed fish.

The long term costs all need to be covered if the concession holder is to remain in the fishery or an aquaculture sector. These long-term costs include direct operating costs, the opportunity cost of family and owner labour, fishery/aquaculture sector management costs, depreciation and the opportunity cost of capital. What remains after the value of these inputs (labour, capital, materials and services) has been netted out is the value of the natural resource itself, i.e. the economic rent (net economic return).

Economic performance, measured through the NER indicator shows the return to the community from harvesting the fishery resource. Although estimates of NER do not reveal how a fishery has performed relative to the maximum potential (i.e. maximum economic yield) in a given period, interpretation of NER trends and drivers, together with other economic indicators, can assist in assessing the fishery's performance against the objective of maximising economic efficiency in the exploitation of fisheries resources (Skirtun 2014).

A fishery's net economic return for a given time period can be defined as:

$$NR = R - CC - OWNFL + ILR - OppK - DEP + recMC - totMC$$

Where:

NR = net returns

R = total cash receipts attributable to the fishery, excluding leasing income i.e. fish sale receipts

CC = total cash costs attributable to the fishery

OWNFL= imputed cost of owner and family labour

ILR = interest and quota/permit leasing costs

OppK = opportunity cost of capital

DEP = depreciation

recMC = recovered management costs

totMC = total management costs.

Net economic return may not be a high priority indicator in an economic contributions study but most elements required to estimate its value will be available or readily assessable in undertaking a contributions study. As noted above, NER shows the return to the community from harvesting the fishery resource or from utilising the marine resource for aquaculture and, as such, could be a useful complementary indicator to report in an economic contributions study.

2.3. Economic Contributions

A fishery is a common property resource and, as such, can be thought of as being owned by the broader community, not just the fishers who have access to the resource. The management of the fishery will be on behalf of this broader community and will generally include a range of social and economic objectives that are wider in scope than the indicators described in Sections 2.1 and 2.2. Indicators reflecting these broader community objectives might include:

- Employment - direct and indirect
- Provision of services to the fishing industry
- Contribution of the fishery to gross domestic product
- Exports.

2.3.1. Employment

A commonly asked question is 'how many people are actually being employed as a result of fishery X?'

The employment question is generally in two parts:

- direct employment - this includes jobs directly in fishing and aquaculture operations (i.e. skipper, crew and management) and may be extended along the seafood industry supply chain to include fish processing, transport, retailing and food service (restaurants, etc.) sectors; and
- indirect employment - this is the flow-on or multiplier employment generated in the regions under consideration and represented by jobs in the seafood industry support sectors, e.g. fuel and provision suppliers, fishing gear and equipment manufacturers and retailers, business support services (accountants, lawyers), jobs in the businesses that provide jobs to the support services and employment in the businesses where the skipper and crew and others directly engaged in the seafood industry spend their money, e.g. local supermarket, restaurants, hotels, etc.

The only way to collect direct employment in the fishing industry is through a survey of fishing concession holders and other businesses in the seafood supply chain.

The estimation of indirect employment is usually made using some form of national or regional economic model (e.g. input-output model, computable general equilibrium model). Consequently, the capacity to estimate indirect employment will be constrained by the existence of such economic models and the additional fishing industry data that would be required by the models.

Employment in a fishing business (and other businesses along the supply chain, if relevant) should include a measure of the number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalent (fte) jobs. While total number of jobs may be of interest and can be reported, the number of fte jobs should be calculated or estimated as best as is possible as it will provide a consistent and comparable data series over time.

2.3.2. Provision of services to the fishing industry

In a way identical to that described for employment, the value of fishing and aquaculture industry activity can be categorised as either direct activity (i.e. part of the fishing and aquaculture industry supply chain) or indirect activity (i.e. services to the fishing and aquaculture industry). Such activity can be measured by its value in dollar terms, and is usually expressed as the value of output. This indicator needs to be used with care as it includes elements of double counting (e.g. the value of output of the fish processing sector includes the value of the raw product). Direct and indirect output are defined as follows:

- direct output - this includes fishing GVP and may be extended along the seafood industry supply chain to include the value of fish processing, transport, retailing and food service (restaurants, etc.) sectors; and
- indirect output - this includes the services to the fishing industry as represented by output in the seafood industry support sectors, e.g. fuel and provision suppliers, fishing gear and equipment manufacturers and retailers, and business support services (accountants, lawyers, etc.).

2.3.3. Contribution to gross domestic product or gross regional product

Contribution to GDP is a measure of the net contribution of an activity to the national economy (GRP is the equivalent for a region). Contribution to GDP 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). By this definition it represents payments to the primary inputs of production (labour, capital and land). Using contribution to GDP as a measure of economic contribution avoids the problem of double counting that may arise from using value of output for this purpose.

Like employment and output, contribution to GDP can be categorised as either direct activity (i.e. contribution to GDP by businesses along the fishing industry value chain) or indirect activity (i.e. contribution to GDP by services to the fishing industry).

2.3.4. Exports

Because exports and balance of trade considerations have a direct effect on the macroeconomic performance of any country, detailed reporting of export statistics is highly desirable, and should include the following where possible:

- Value (free-on-board (fob)) and quantity
- Processed and unprocessed - this may include a distinction between chilled, frozen, cooked, etc.
- Country of destination - tracking the relative size of major markets over time is extremely useful and the value and quantity data can sometimes be reported for each country.

3. AVAILABLE FISHERIES AND AQUACULTURE DATA

3.1. Tasmanian Fisheries and Aquaculture Data Availability

Tasmanian data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.1.1 and Table 3-1) and aquaculture (Section 3.1.2 and Table 3-2).

3.1.1. Fisheries data

Catch

Catch data are collected for all fisheries and available via Institute for Marine and Antarctic Studies (IMAS) database query. Confidentiality issues may exist for minor fisheries with few active operators. Historic catch data may also be limited in minor fisheries.

The Banded Morwong Fishery (viewed as a separate fishery by FRDC) is part of the Scalefish Fishery and is only separated because it is quota managed. Catch data for this fishery can be made available.

Tasmanian fisheries confidentiality standards require either permission from licence holders or at least five active fishers per requested data.

Table 3-1 Assessment of available fisheries data, Tasmania

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees ^b	Cost of fishing ^a
Abalone	✓	✓	✓	✓	✓			✓
Commercial Dive	✓	✓	✓	✓	✓			
Giant Crab	✓	✓	✓	✓	✓			
Octopus	n.p. ^d	n.p. ^d	n.p. ^d	n.p. ^d	n.p. ^d			
Rock Lobster	✓	✓	✓	✓	✓			✓ ^c
Scalefish	✓	✓	✓	✓	✓			
Scollap	✓	✓	✓	✓	✓			
Seaweed	n.p. ^d	n.p. ^d	n.p. ^d	n.p. ^d	n.p. ^d			
Shellfish	✓	✓	✓	✓	✓			
Developmental								

^a Within the last five years.

^b Licence fees are generally estimated as 7 per cent of GVP.

^c Survey planned for 2018. Last survey was in 2007.

^d Data publically available in some reports despite having less than five active fishers.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Tasmanian Department of Primary Industries, Parks, Water and Environment and personal communication (11/7/18)

Prices

Price data are collected through processor returns or landing dockets from fisheries. Price data are regularly updated and are available for the last ten years. IMAS is in the process of requesting the Tasmanian Department of Primary Industries, Parks, Water and Environment (DPIPWE) to make this data stream available to them. General “scorecard” data, including GVP, are available from AgriGrowth Tasmania (n.d.).

Effort, active vessels and boat length

Effort and active vessels figures are collected and available via IMAS database query. Effort is also reported in IMAS fishery assessments. In addition to days fished, effort by fishery is also provided in the following terms:

- Abalone: Hours fished
- Rock Lobster: Pot lifts
- Giant Crab: Pot days
- Octopus: Pot lifts
- Scallop: Hours fished
- Scalefish: Days fished by main gear type.

Boat length data for the Rock Lobster Fishery can be made available by IMAS. Boat length for other fisheries can be established using fishery licencing data and Australian Maritime Safety Authority data.

Management cost and licence fees

Licence fees and management costs are not collected by DPIPWE. Licence fees are approximated as 7 per cent of fishery GVP.

Cost of fishing

Knuckey and Sen (2017) reviewed Abalone dive rates in 2017. While this report is not primarily focused on economic contribution, it provides expenditure, employment, catch and GVP data for wild catch Abalone businesses in Tasmania. These data provide usable catch data and a starting point for modelling the cost structure of businesses in this industry as part of a national contributions study.

An earlier study prepared by EconSearch (2013b) surveyed fishing costs in the Abalone Fisheries across South Australia, Tasmania and New South Wales, and reported on key economic indicators.

3.1.2. Aquaculture data

Production

Production data are collected quarterly by DPIPWE for all aquaculture sectors and can be made available on request. Salmon and Ocean Trout production are also collected by DPIPWE, but confidentialised (into Salmonids) due to the limited number of operators (at least five required to publish data).

Prices

GVP data are collected by DPIPWE for all aquaculture sectors and can be made available on request. From GVP average price data can be imputed.

Table 3-2 Assessment of available aquaculture data, Tasmania

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Abalone	✓	✓	✓	✓	✓	
Mussels	✓	✓	✓	✓	✓	
Oysters	✓	✓	✓	✓	✓	
Salmonids	✓	✓	✓	✓	✓	✓

^a Within the last five years.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Tasmanian Department of Primary Industries, Parks, Water and Environment and personal communication (23/7/18)

Number of active operators

The number of active operators are collected by DPIPWE for all aquaculture sectors and can be made available on request.

Management cost and licence fees

Licence fee data are collected by DPIPWE and can be made available on request. Tasmanian licences fees are linked to aquaculture management costs. Levies are included in licencing and provide funding for specific management objectives. This includes levies for Tasmanian Seafood Industry Council membership, shellfish quality control, Salmon industry planning and Oyster research.

Cost of production

A socio economic study of the TASSAL West of Wedge Development was undertaken by the Institute of Project Management (IPM 2016).

An economic contribution assessment of the Tasmanian aquaculture industry was undertaken by KPMG for the Tasmanian Salmonid Growers Association (KPMG 2015). The report presents employment, expenditure, production and GVP data for Salmonoid Aquaculture in Tasmania in 2013/14. While the production and GVP data may no longer be current, the expenditure and employment data are usable starting points for modelling the cost structure of businesses in the industry as part of a national contributions study.

3.2. South Australian Fisheries and Aquaculture Data Availability

South Australian data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.2.1 and Table 3-3) and aquaculture (Section 3.2.2 and Table 3-4).

3.2.1. Fisheries data

Catch

Catch data are collected by the South Australian Research and Development Institute (SARDI) and made available via Primary Industries and Regions South Australia (PIRSA) data request. Catch data are also publically available in EconSearch fishery economic indicator reports (EconSearch 2018a-j) and SARDI stock assessment reports.

South Australian fisheries confidentiality standards require at least five active fishers per requested data. For where there are fewer than five active fishers per requested data, permission is required from the affected fishers to release the data.

Prices

GVP data are collected by SARDI and made available via PIRSA data request. GVP data are also available by major species for the multi species fisheries (i.e. Marine Scalefish and Lakes and Coorong Fisheries). Monthly price data are also collected by SARDI and available by request.

GVP and prices are also publically available in EconSearch fishery economic indicator reports (EconSearch 2018a-j).

Effort, active vessels and boat length

Days fished and active licence counts data are collected by SARDI and made available via PIRSA data request. In addition to days fished, effort by fishery is also provided in terms of pot lifts in the Rock Lobster and Blue Crab fisheries.

Boat length data for active vessels are collected by EconSearch through a survey of commercial fisheries every three years (EconSearch 2018a-j).

Table 3-3 Assessment of available fisheries data, South Australia

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Abalone	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Blue Crab	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Charter Boat	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Lakes and Coorong	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Marine Scalegfish	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Gulf St Vincent	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Spencer Gulf Prawn	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Northern Rock Lobster	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Southern Rock Lobster	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Sardine	✓	✓	✓	✓ ^b	✓	✓	✓	✓
West Coast Prawn	✓	✓	✓	✓ ^b	✓	✓	✓	✓
Miscellaneous	✓	✓		✓ ^b				

^a Within the last five years.

^b Only active licence counts available.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Primary Industries and Regions South Australia and EconSearch analysis

Management cost and licence fees

Licence fees for all South Australian fisheries are collected by PIRSA and made available via data request.

As South Australian fisheries operate on a full cost recovery basis, management costs can be estimated based on licence fee data. The available licencing data are itemised by management activities and fishery zones.

Cost of fishing

Annual economic indicator reports are produced by EconSearch for all SA fisheries, excluding the Miscellaneous fishery (EconSearch 2018a-j). The compilation of the economic indicator reports involves a survey of commercial fisheries every three years. Data collected includes detailed operating cost and capital expenditure. Cost data are updated for the two years between surveys using a range of variously sourced catch, effort and price data.

3.2.2. Aquaculture data

Production

Production data are collected by PIRSA and are made available via data request. Data are provided by individual operator and include information on species (e.g. Oysters, Tuna, etc.), type (fingerlings, mature, etc.) and weight and/or quantity sold. These data are identifiable and must be aggregated before publishing. Production data are also publically available in EconSearch aquaculture economic contribution reports (EconSearch 2018K).

Prices

Average farm gate prices for species sold are collected by PIRSA and are made available via data request. Price and GVP data are also publically available in EconSearch aquaculture economic contribution reports (EconSearch 2018k).

Number of active operators

Active operator counts are collected by PIRSA and are made available via data request. The number of active producers are also publically available in EconSearch aquaculture economic contribution reports (EconSearch 2018k).

Table 3-4 Assessment of available aquaculture data, South Australia

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Abalone	✓	✓	✓	✓	✓	
Freshwater Finfish	✓	✓	✓	✓	✓	
Marine Finfish	✓	✓	✓	✓	✓	
Marron & Yabbies	✓	✓	✓	✓	✓	
Mussels	✓	✓	✓	✓	✓	
Oysters	✓	✓	✓	✓	✓	
Southern Blue Fin Tuna	✓	✓	✓	✓	✓	
Tourism	✓	✓	✓	✓	✓	
Other aquaculture ^b	✓	✓	✓	✓	✓	

^a Within the last five years.

^b Other aquaculture production in 2016/17 includes Algae, Silver Perch (including fingerlings and spat) and Goldfish production.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Primary Industries and Regions South Australia and EconSearch analysis

Management cost and licence fees

A leasing and licence fee schedule is published by PIRSA.

South Australian aquaculture management operates on a cost recovery basis. Management costs can be established based on estimated leasing and licensing fees.

Cost of production

Annual economic contribution reports are produced by EconSearch for South Australian aquaculture (EconSearch 2018k). The economic contribution reports estimate aquaculture costs based on various surveys of producers and ad hoc industry feedback on standard enterprise cost structures. These can be best described as modelled cost data rather than survey-based cost data.

3.3. NSW Fisheries and Aquaculture Data Availability

NSW data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.3.1 and Table 3-5) and aquaculture (Section 3.3.2 and Table 3-6).

3.3.1. Fisheries data

Catch

Catch data are collected by New South Wales Department of Primary Industries (NSWDPI) and made available via data request. New South Wales Fisheries confidentiality standards require at least five active fishers per requested data.

Prices

GVP is imputed by NSWDPI based on Sydney Fish Market Prices. This limits GVP estimates to one market price. However, it provides the only basis on which GVP estimates can be made.

Effort, active vessels and boat length

Days fished and number of active fishing business data are collected by NSWDPI and made available via data request. It is recognised that there are limitations to using active business counts in place of active vessels. NSWDPI also collect limited vessel information (e.g. average boat length) and linkage options per fishery (e.g. information about participation in other fisheries).

Table 3-5 Assessment of available fisheries data, New South Wales

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Abalone	✓	✓	✓	✓ ^b	✓			✓
Developmental Commercial								
Estuary General	✓	✓	✓	✓ ^b	✓			
Estuary Prawn Trawl	✓	✓	✓	✓ ^b	✓			
Inland Restricted	✓	✓						
Lobster	✓	✓	✓	✓ ^b	✓			
Ocean Hauling	✓	✓	✓	✓ ^b	✓			
Ocean Trap and Line	✓	✓	✓	✓ ^b	✓			
Ocean Trawl	✓	✓	✓	✓ ^b	✓			
Sea Urchin and Turban Shell Restrictd	✓	✓	✓	✓ ^b	✓			
Charter Boat	✓		✓	✓ ^b	✓			

^a Within the last five years.

^b Only active business counts available

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: New South Wales Department of Primary Resources and personal communication.

Management cost and licence fees

Licence fee data are not publically available.

Cost of fishing

As noted in Section 2.1.3, AgEconPlus et al (2015) developed a cost of fishing estimation method to support the analysis of the NSW commercial fisheries reform package (excluded quota fisheries such as Abalone and Rock Lobster). Under this method, operating expenditure for an average active fishing business in each fishery was imputed by aligning cost data extracted from economic indicator studies undertaken by EconSearch in South Australia to relevant NSW share class fisheries, with appropriate adjustments for days fished and other comparable information. These data would provide a usable starting point for modelling the cost structure of businesses in these fisheries as part of a national contributions study. EconSearch (2013a) surveyed fishing costs in the Abalone fishery in New South Wales and reported on key economic indicators, including cost of fishing.

3.3.2. Aquaculture data

Production

Production data are collected by NSW DPI for all aquaculture sectors and are reported in the *Aquaculture Production Report* (NSWDPI 2018). Production data for ‘other aquaculture’ is not published as it consists of many different species.

Table 3-6 Assessment of available aquaculture data, New South Wales

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Black Tiger Prawn	✓	✓	✓	✓	✓	
Yabby	✓	✓	✓	✓	✓	
Yabby (bait)	✓	✓	✓	✓	✓	
Barramundi	✓	✓	✓	✓	✓	
Goldern Perch	✓	✓	✓	✓	✓	
Murray Cod	✓	✓	✓	✓	✓	
Rainbow Trout	✓	✓	✓	✓	✓	
Silver Perch	✓	✓	✓	✓	✓	
Hatchery Species	✓	✓	✓	✓	✓	
Sydney Rock Oyster	✓	✓	✓	✓	✓	
Pacific Oyster	✓	✓	✓	✓	✓	✓
Native Oyster	✓	✓	✓	✓	✓	✓
Oyster Spat	✓	✓	✓	✓	✓	
Other aquaculture ^b	n.p.	✓	✓	✓	✓	

^a Within the last five years.

^b Species include: Akoya Pearl, Australian Paratya, Bloodworms, Blue Mussel, Brook Trout, Floodplain Mussels, Moreton Bay Bugs, Mulloway, Native Oysters.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: New South Wales Department of Primary Resources and personal communication (16/7/18)

Prices

GVP is imputed by NSW DPI based on Sydney Fish Market Prices. This limits GVP estimates to one market price. However, it provides the only basis on which analysis can be undertaken. GVP figures are reported in NSW DPI (2018).

Number of active operators

The number of active operators is collected for all aquaculture sectors and can be made available on request.

Management cost and licence fees

Licence fee data are collected by NSW DPI. A fee schedule is published by the department. Licence fees can be calculated using the fee schedule and licencing information provided by NSW DPI.

New South Wales licences fees are paid into a trust which funds aquaculture management. It is noted that fees currently charged are inadequate to cover management costs. A review of licence fees is planned, and should result in equating licence fees to expected management costs.

Cost of production

An FRDC funded social and economic evaluation of New South Wales coastal aquaculture was undertaken by Barclay et al. (2016). The study provides detailed cost information for Oyster and non-Oyster businesses. Due to insufficient responses aquaculture species were aggregated into the non-Oyster descriptor. It is recognised that there would be limitations to using the non-Oyster business data for a national contributions study.

3.4. Victorian Fisheries and Aquaculture Data Availability

Victoria data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.4.1 and Table 3-7) and aquaculture (Section 3.4.2 and Table 3-8).

3.4.1. Fisheries data

Catch

Catch data are collected for all fisheries. Confidentiality issues exist, given that individual fisheries are divided by region, species and method (e.g. trawl, dive, etc.). To confidentialise data, fishery catch is aggregated by location. This aggregation can be problematic for modelling purposes as it groups dissimilar fishing methods and species caught.

Typically, the fisheries are aggregated as follows

- *Gippsland and Lake Tyres fisheries*: Gippsland Lakes Bait Fishery, Gippsland Lakes Fishery, Gippsland Lakes Mussel Dive Fishery and Lake Tyres Bait Fishery.
- *Offshore fisheries*: Inshore Trawl Fishery, Ocean Fishery, Ocean Purse Seine Fishery, Pipi Fishery and Ocean Scallop Fishery
- *Port Phillip Bay fisheries*: Port Phillip Bay Mussel Bait Fishery, Port Phillip Western Port Fishery and Port Phillip Bay Dive Scallop Fishery.

Obtaining data for the Port Phillip Scallop Dive fishery may be problematic. There is only one licence in this fishery with a significant quota (approximately 600t). The ocean scallop fishery has a low level of activity and too different (i.e. by method) to be a viable candidate for aggregation.

Obtaining data for the Pipi fishery may be difficult given it is a developmental fishery. Similarly, most of the bait fisheries are likely to be too small to report separately. These being the Mallacoota Lower Lake Bait (1 licence), Lake Tyres Bait (1), Snowy River Bait (2) and Sydenham Inlet Bait fisheries (2).

Victorian fisheries confidentiality standards require at least five active fishers per requested data.

The Banded Morwong Fishery (viewed as a separate fishery by FRDC) is part of the Victorian Offshore fisheries. Historic catch figures are provided, however data relating to recent years (2005/06 to 2010/11 and 2012/13 and 2016/17) has been confidentialised due to a lack of fishers reporting Banded Morwong catch.

Prices

GVP data are readily available for key single species fisheries (Rock Lobster, Giant Crab and Abalone). Price/GVP estimates for multi species fisheries can be estimated using fishery catch data (by species) and price data.

Abalone price is given for all zones combined. This is inconsequential for a whole of state economic analysis. Prices are unlikely to vary between geographic locations.

Table 3-7 Assessment of available fisheries data, Victoria

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Abalone Central Zone	✓	✓	✓	✓		n.p.	n.p.	
Abalone Eastern Zone	✓	✓	✓	✓		n.p.	n.p.	
Abalone Western Zone	✓	✓	✓	✓		n.p.	n.p.	
Corner Inlet	✓	✓ ^b	✓	✓		n.p.	n.p.	
Eel	✓	✓	✓	✓		n.p.	n.p.	
General Bait	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Giant Crab	n.p.	n.p.	n.p.	n.p.		n.p.	n.p.	
Gippsland Lakes Bait	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Gippsland Lakes	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Gippsland Lakes Mussel Dive	n.p.		n.p.	n.p.		n.p.	n.p.	
Inshore Trawl	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Mallacoota Lower Lake Bait	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Lake Tyers Bait	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Ocean	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Ocean Purse Seine	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Ocean Scallop	n.p.	n.p.	n.p.	n.p.		n.p.	n.p.	
Pipi	n.p.		n.p.	n.p.		n.p.	n.p.	
Port Philip Bay Mussel Bait	n.p.		n.p.	n.p.		n.p.	n.p.	
Port Philip Western Port	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Port Phillip Bay Dive Scallop	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Sea urchin	✓		✓	✓		n.p.	n.p.	
Snowy River Bait	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Southern Rock Lobster Eastern Zone	✓	✓	✓	✓		n.p.	n.p.	
Southern Rock Lobster Western Zone	✓	✓	✓	✓		n.p.	n.p.	
Sydenham Inlet Bait	n.p.	n.p. ^b	n.p.	n.p.		n.p.	n.p.	
Wrasse	✓	✓	✓	✓		n.p.	n.p.	
Charter Boat								

^a Within the last five years.

^b Latest price data for non-key species are generally for 2014/15.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Victorian Fisheries Authority and personal communication (11/7/18)

Latest price data for the multi species fisheries generally date to 2014/15. Price data for some key species (such as Australian Salmon, Pilchards and Shortfin Eels) are updated on a yearly basis.

Price data are unavailable for Sea urchins.

Effort, active vessels and boat length

Days fished and active vessels are collected in log book returns in all fisheries. Similar to catch data, the confidentiality requirement is that there be five active fishers.

Diver hours are also available for the Abalone fisheries and pot lifts are also collected for the Rock Lobster and Giant Crab fisheries.

Boat length or any other close proxy, are not collected by the Victorian Fisheries Authority (VFA). Total number of pots are available for the Rock Lobster fisheries, however estimating boat length and capital costs based on these data would be problematic.

Management cost and licence fees

Licence fee data are collected by VFA. However, this information is not publically available.

Victorian fisheries operate on a full cost recovery basis. Management costs can be established if an agreement to receive licence fee data is reached.

Cost of fishing

VFA has not undertaken any economic or fishing cost studies in the past five years.

Other

Charter fishing is licenced through Maritime Safety Victoria.

3.4.2. Aquaculture data

Production

Production data are collected by VFA for all aquaculture sectors and are reported in the *Commercial Fish Production Information Bulletin* (VFA 2017).

Prices

GVP data are available for key species (Salmonids, Abalone and Mussels). Confidentiality issues exist for the remaining sectors (i.e. Freshwater Eels, Warmwater Finfish, Yabbies, ornamental fish and other aquaculture).

Table 3-8 Assessment of available aquaculture data, Victoria

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Freshwater Eels	✓	n.p.	✓	n.p.	n.p.	
Salmonids	✓	✓	✓	n.p.	n.p.	
Warmwater Finfish (Inland)	✓	n.p.	✓	n.p.	n.p.	
Yabby	✓	n.p.	✓	n.p.	n.p.	
Abalone	✓	✓	✓	n.p.	n.p.	
Blue Mussel & Other Molluscs (Bivalves)	✓	✓	✓	n.p.	n.p.	
Ornamental Fish	✓	n.p.	✓	n.p.	n.p.	
Other aquaculture ^b	✓	n.p.	✓	n.p.	n.p.	

^a Within the last five years.

^b Mussels and crustaceans.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Victorian Fisheries Authority and personal communication (11/7/18)

Number of active operators

The number of active operators is collected for all aquaculture sectors.

Management cost and licence fees

Licence fee data are collected by VFA. However, this information is not publically available.

Victorian aquaculture management operates on a cost recovery basis. Management costs can be established if an agreement to obtain licence fee data is reached.

Cost of production

VFA has not recently undertaken any economic or aquaculture production cost studies.

3.5. Northern Territory Fisheries and Aquaculture Data Availability

Northern Territory data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.5.1 and Table 3-9) and aquaculture (Section 3.5.2 and Table 3-10).

3.5.1. Fisheries data

Catch

Catch data by species are collected for all fisheries by the Northern Territory Department of Primary Industries and Resources (NTDPIR), and can be made available via data request. Catch data for some fisheries are also published by NTDPIR in the *Status of Key Northern Territory Fish Stocks Report* (NTDPIR 2017).

Some fisheries are characterised by a low number of active licence holder and will need to be aggregated before publishing data. This aggregation can be problematic for modelling purposes as it groups dissimilar fishing methods and species caught.

Northern Territory fisheries confidentiality standards require at least five active fishers per requested data.

Table 3-9 Assessment of available fisheries data, Northern Territory

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Coastal Line	✓	✓	✓	✓	✓		✓	
Coastal Net	n.p.	✓	n.p.	✓	✓		✓	
Bait Net	n.p.		n.p.	✓	✓		✓	
Spanish Mackerel	✓	✓	✓	✓	✓		✓	
Offshore Net and Line	✓	✓	✓	✓	✓		✓	
Demersal	✓	✓	✓	✓	✓		✓	
Barramundi	✓	✓	✓	✓	✓		✓	
Mud Crab	✓	✓	✓	✓	✓		✓	
Mollusc	n.p.		n.p.	✓			✓	
Pearl Oyster	n.p.		n.p.	n.p.	✓		✓	
Aquarium	n.p.		n.p.	✓	✓		✓	
Trepang	✓	✓	✓	✓	✓		✓	
Development	✓		n.p.	✓	✓		✓	
Jigging	n.p.		n.p.	✓	✓		✓	
Timor Reef	✓	✓	✓	✓	✓		✓	
Charter Boat ^b	✓		n.p.	✓	✓		✓	

^a Within the last five years.

^b Also known as the fishing tour operator sector.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Northern Territory Department of Primary Industries and personal communication

Prices

Price data by species and fishery are collected by the NTDPIR and made available via data request. GVP data for some fisheries are also published by NTDPIR in the *Status of Key Northern Territory Fish Stocks Report* (NTDPIR 2017).

Effort, active vessels and boat length

Days fished and active licence data are collected in log book returns in all fisheries.

Linkages between fisheries and active vessel data (in the form of a list of registered licences per boat) was also available for the 2015 calendar year. Average vessel length data was also available for 2015/16.

Management cost and licence fees

Licence fee data are collected by NTDPIR and can be made available via data request.

Northern Territory fisheries do not operate on a full cost recovery basis. Management costs on a per fishery basis are not collected by NTDPIR.

Cost of fishing

EconSearch used South Australian cost of fishing data with Northern Territory fishery data (described above) to assess the economic contribution of Northern Territory fisheries and aquaculture (EconSearch 2018).

3.5.2. Aquaculture data

Production

Production data are collected by NTPDIR for all aquaculture sectors. Production is aggregated into a total figure due to the limited number of producers in the jurisdiction.

Prices

Price data are collected by NTDPIR for all aquaculture sectors. The figures allow NTDPIR to report GVP to ABARES. GVP is aggregated into a total figure due to the limited number of producers in the jurisdiction.

Number of active operators

The number of active operators is collected for all aquaculture sectors.

Table 3-10 Assessment of available aquaculture data, Northern Territory

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Aquaculture (includes barramundi)	n.p.	n.p.	n.p.		✓	
Pearl Oyster Culture	n.p.	n.p.	✓		✓	
Ornamental Aquaculture		n.p.			✓	

^a Within the last five years.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Northern Territory Department of Primary Industries

Management cost and licence fees

Licence fee data are collected by NTDPIR and can be made available via data request.

Management of Northern Territory aquaculture is not on a cost recovery basis. Management costs on a per sector basis is not collected by NTDPIR.

Cost of production

EconSearch (2018l) used South Australian aquaculture cost of production data to estimate corresponding Northern Territory cost data (described above).

3.6. Queensland Fisheries and Aquaculture Data Availability

Queensland data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.6.1 and Table 3-11) and aquaculture (Section 3.6.2 and Table 3-12).

3.6.1. Fisheries data

Catch

Catch data are available for all fisheries in the *Queensland Fisheries Summary Report* (QDAF 2018a).

Queensland Department of Agriculture and Fisheries (QDAF) also provides an online interface tool, “QFish”, which can query datasets. QFish provides catch, days fished, and active licence count data by main fishing method (e.g. line, net, trawl) and species.

Charter boat catch data are available from QFish; however, log book returns are only required for offshore fishing trips. This is defined as beyond three nautical miles seaward of the territorial sea baseline (high tide). Some catch, particularly species which are targeted nearshore (e.g. crabs), may be understated in the data.

Queensland fisheries confidentiality standards require at least five active boats per requested data.

Prices

Price data were collected for 2012. The 2012 figures allow QDAF to report GVP to ABARES and in QDAF (2018a). QDAF advise the GVP figures may be unreliable for economic analysis, and suggest making price adjustments in line with the *Australian Fisheries and Aquaculture Statistics Report* (Patterson et al. 2017).

Effort, active vessels and boat length

Days fished and active licences are collected in log book returns. These figures are also available by major fishing method (e.g. line, net, trawl, etc.) and species on QFish. As with catch data, the confidentiality requirement of five active fishers applies.

Queensland’s public register of fishing authorities (FishNet Public) can be used to query licensing data for various fishery symbols⁵. The register provides boat length data, as well as hull units, beam, depth and main engine power figures. However, the register only includes primary boats which are recorded on the licence card. Tender boats, which are used with a primary boat in certain fisheries, cannot be longer than 7 metres. The absence of tender boat registrations means that only the number of active licences can be collected rather than the number of active vessels.

⁵ Queensland fisheries differ from other jurisdiction as fishery symbol (opposed to licences) gives fishers authority to operate in particular fisheries. Symbols are registered to a Queensland commercial fishing or harvest licence, and in some fisheries can be used with non-primary (tender) boat(s).

Table 3-11 Assessment of available fishery data, Queensland

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Blue Swimmer Crab	✓	✓ ^b	✓	✓ ^c	✓ ^e		✓	
Coral	✓	✓ ^b	✓	✓ ^c	✓		✓	
Coral Reef Fin Fish	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
Crayfish and Rock Lobster	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
Deep Water Fin Fish	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
East Coast Inshore Fin Fish	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
East Coast Otter Trawl	✓	✓ ^b	✓	✓ ^c	✓		✓	
East Coast Pearl	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
East Coast Spanish Mackerel	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
Fin Fish (Stout Whiting) Trawl	✓	✓ ^b	✓	✓ ^c	✓		✓	
Gulf of Carpentaria Developmental Fi	✓	✓ ^b	✓	✓ ^c			✓	
Gulf Of Carpentaria Inshore Fin Fish	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
Gulf of Carpentaria Line	✓	✓ ^b	✓	✓ ^c	✓ ^f		✓	
Marine Aquarium Fish	✓		✓	✓ ^c	✓ ^f		✓	
Minor Harvest	✓		✓	✓ ^c	✓ ^f		✓	
Mud Crab	✓	✓ ^b	✓	✓ ^c	✓ ^e		✓	
Queensland Eel Adult	✓	✓ ^b	✓	✓ ^c	n.a.		✓	
Queensland Eel Juvenile	✓	✓ ^b	✓	✓ ^c	n.a.		✓	
River And Inshore Beam Trawl	✓	✓ ^b	✓	✓ ^c	✓		✓	
Rocky Reef Fin Fish	✓	✓ ^b	✓	✓ ^c	✓ ^e		✓	
Sea Cucumber	✓		✓	✓ ^c	n.a.		✓	
Spanner Crab	✓	✓ ^b	✓	✓ ^c	✓		✓	
Trochus	✓		✓	✓ ^c			✓	
Developmental Fin Fish Trawl	✓	✓ ^b	✓	✓ ^c			✓	
Charter Boat	✓ ^d		✓ ^d	✓ ^{cd}			✓	

^a Within the last five years.

^b Latest price data are from 2012.

^c Only active licence counts available.

^d Log book returns are only required for offshore fishing trips.

^e Boat length may be difficult to determine (fishery symbol shared across fisheries).

^f Data may be incomplete or require updating.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Queensland Department of Agriculture and Fisheries and personal communication (16/07/18)

Determining boat lengths for fisheries with authority to access the same resource may be difficult. Difficulty may exist in the Blue Swimmer Crab and Mud Crab fisheries where, despite the fishers having the same access, they are likely to use different vessels in each fishery.

Management cost and licence fees

Licence fee data are collected by QDAF. A fee schedule is publically available on the Business Queensland web portal. Licence fees can be calculated using the fee schedule and licencing information on FishNet Public.

Queensland fisheries do not operate on a full cost recovery basis. Management costs on a per fishery basis are not compiled or reported by QDAF.

Cost of fishing

QDAF has not recently undertaken any economic or fishing cost studies.

3.6.2. Aquaculture data

Production

All holders of an aquaculture development authority (licence) are required to complete a mandatory annual production survey. Production data are reported in the *Ross Lobbegeiger report to farmers - Aquaculture production summary report* (QDAF 2018b).

Prawns production (e.g. Banana, Black Tiger and Kuruma) are provided as a total production figure. Similarly, Golden Perch, Mud Crab, Eel, Sea Scallops and other marine fish production are not published separately but rather in aggregate due to confidentiality reasons.

Table 3-12 Assessment of available aquaculture data, Queensland

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Barramundi	✓	✓	✓		n.a.	✓ ^b
Banana Prawns	n.p.	n.p.	✓		n.a.	n.p. ^b
Black Tiger Prawns	n.p.	n.p.	✓		n.a.	n.p. ^b
Jade Perch	✓	✓	✓		n.a.	✓ ^b
Golden Perch	n.p.	n.p.	✓		n.a.	n.p. ^b
Kuruma Prawns	n.p.	n.p.	✓		n.a.	n.p. ^b
Mud Crab	n.p.	n.p.	✓		n.a.	n.p. ^b
Redclaw Crayfish	✓	✓	✓		n.a.	✓ ^b
Rock Oyster	✓	✓	✓		n.a.	✓ ^b
Shortfin and Longfin Eel	n.p.	n.p.	✓		n.a.	n.p. ^b
Silver Perch	✓	✓	✓		n.a.	✓ ^b

^a Within the last five years.

^b Only employment estimates, production and ponded area figures are collected..

Key: ✓ = data available, n.p. = data collected but not published,

n.a. = not applicable, Blank/grey = No data collected.

Source: Queensland Department of Agriculture and Fisheries and personal communication (11/7/18)

Prices

Up to date price data and GVP estimates are also provided in QDAF (2018b). Confidentiality issues exist for the same sectors discussed above in the production section.

Number of active operators

QDAF (2018b) provides the number of producing farms for all non confidentialised sectors. Disaggregated counts of producing farms can be provided by QDAF.

Management cost and licence fees

There are no licence fees for Queensland aquaculture. Aquaculture management costs on a per sector basis are not compiled or reported by QDAF.

Cost of production

QDAF provide aquaculture employment estimates, production and ponded area figures by statistical division in QDAF (2018b).

3.7. West Australian Fisheries and Aquaculture Data Availability

West Australian data currently available to prepare a fisheries and aquaculture contributions assessment, along with data gaps, are detailed in this section. The information is presented separately for fisheries (Section 3.7.1 and Table 3-13) and aquaculture (Section 3.7.2 and Table 3-14).

3.7.1. Fisheries data

Catch

Catch data are collected by Western Australia Primary Industries and Regional Development⁶ (WAPIRD) for all fisheries and can be made available on request. Catch data are also published in the *Status Reports of the Fisheries and Aquatic Resources of Western Australia* (Gaughan and Santoro 2018). Confidentiality issues exist, given that individual fisheries are divided by region, species and method (e.g. trawl, dive). To confidentialise data, fishery catch will need to be aggregated by similar fishing methods and species caught.

Western Australian fisheries confidentiality standards require at least three active fishers per requested data.

Prices

WAPIRD regularly collect and update price data for each marine species caught in Western Australia. The prices are based on data from West Australian land based processors and are based on whole weight. Average prices per kilogram by species are published in Gaughan and Santoro (2018). GVP by fishery is also published in the report (alongside catch).

Effort, active vessels and boat length

Days fished and active vessels are collected in log book returns in all fisheries. Similar to catch data, the confidentiality requirement is that there be three active fishers.

Boat length or any other close proxy, is not compiled or reported by the WAPIRD. Boat lengths can be established using fishery licencing data and Australian Maritime Safety Authority data.

⁶ Formally Western Australian Department of Fisheries.

Table 3-13 Assessment of available fisheries data, Western Australia

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Abalone (greenlip/brownlip)	✓	✓	✓	✓	✓		✓	
Abalone (Roe's)	✓	✓	✓	✓	✓		✓	
Abrolhos Islands and Mid West Trawl	✓	✓	✓ ^b	✓	✓		✓	
Albany/King George Sound purse seine	✓	✓	✓	✓	✓		✓	
Bremer Bay and Esperance Purse Seine	✓	✓	✓	✓	✓		✓	
Broome Prawn	✓	✓	✓	✓	✓		✓	✓ ^c
Cockburn Sound Crab	✓	✓	✓ ^b	✓	✓		✓	✓ ^c
Cockburn Sound (Fish Net)	n.p.	n.p.	n.p.	n.p.	n.p.		n.p.	
Cockburn Sound Line and Pot	✓	✓	✓	✓	✓		✓	
Cockburn Sound Mussel	n.p.	n.p.	n.p.	n.p.	n.p.		n.p.	
Exmouth Gulf Prawn	✓	✓	✓	✓	✓		✓	✓ ^c
Gascoyne Demersal Scalefish	✓	✓	✓	✓	✓		✓	
Kimberley Developing Mud Crab	✓	✓	✓	✓	✓		✓	✓ ^c
Kimberley Gillnet and Barramundi	✓	✓	✓	✓	✓		✓	
Kimberley Prawn	✓	✓	✓	✓	✓		✓	✓ ^c
Lake Argyle Catfish	✓	✓	✓	✓	✓		✓	
Mandurah to Bunbury Developing Crab	✓	✓	✓	✓	✓		✓	✓ ^c
Marine Aquarium Fish (Corp and Ind)	✓	✓	✓	✓	✓		✓	
Mackerel	✓	✓	✓	✓	✓		✓	
Nickol Bay Prawn	✓	✓	✓	✓	✓		✓	✓ ^c
Northern Demersal Scalefish	✓	✓	✓	✓	✓		✓	
Northern Shark	✓	✓	✓	✓	✓		✓	
North Coast Shark	✓	✓	✓	✓	✓		✓	
Octopus	✓	✓	✓	✓	✓		✓	
Onslow Prawn	✓	✓	✓ ^b	✓	✓		✓	✓ ^c
Pearl Oyster Fishery	✓	✓	✓	✓	✓		✓	
Peel-Harvey West Coast Crab	✓	✓	✓	✓	✓		✓	
Pilbara Line	✓	✓	✓	✓	✓		✓	
Pilbara Developmental Crab	✓	✓	✓	✓	✓		✓	✓ ^c
Pilbara Fish Trawl	✓	✓	✓	✓	✓		✓	
Pilbara Trap	✓	✓	✓	✓	✓		✓	
Sea Cucumber	✓	✓	✓	✓	✓		✓	
Shark Bay Beach Seine and Mesh Net	✓	✓	✓	✓	✓		✓	
Shark Bay Crabs	✓	✓	✓	✓	✓		✓	✓
Shark Bay Prawn	✓	✓	✓	✓	✓		✓	✓
Shark Bay Scallop	✓	✓	✓	✓	✓		✓	
South Coast Crustacean	✓	✓	✓	✓	✓		✓	✓
South Coast Estuarine	✓	✓	✓	✓	✓		✓	
South Coast Open Access	✓	✓	✓	✓	✓		✓	
South Coast Purse-Seine	✓	✓	✓	✓	✓		✓	
South Coast Salmon	✓	✓	✓	✓	✓		✓	
South Coast Trawl	✓	✓	✓	✓	✓		✓	
South West Trawl	✓	✓	✓	✓	✓		✓	
South West Beach Seine	✓	✓	✓	✓	✓		✓	
South West Coast Salmon	✓	✓	✓	✓	✓		✓	
Southern Demersal Gillnet and Longline	✓	✓	✓	✓	✓		✓	✓
Swan and Canning Rivers Crab	✓	✓	✓	✓	✓		✓	

Fishery	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Temperate Demersal Shark Fishery	✓	✓	✓	✓	✓		✓	
Warnbro Sound Crab	n.p.	n.p.	n.p.	n.p.	n.p.		n.p.	✓ ^c
West Coast Beach Bait	n.p.	n.p.	n.p.	n.p.	n.p.		n.p.	
West Coast Beach Sea Crustacean	n.p.	n.p.	n.p.	n.p.	n.p.		n.p.	
West Coast Deep Sea Crab	✓	✓	✓	✓	✓		✓	✓ ^c
West Coast Deep Sea Crustacean	✓	✓	✓	✓	✓		✓	✓ ^c
West Coast Demersal Scalefish	✓	✓	✓	✓	✓		✓	
West Coast Demersal Gillnet and Longline	✓	✓	✓	✓	✓		✓	
West Coast Estuarine	✓	✓	✓	✓	✓		✓	
West Coast Purse Seine	✓	✓	✓	✓	✓		✓	
West Coast Rock Lobster	✓	✓	✓	✓	✓		✓	✓
Charter Boat	✓	✓	✓	✓	✓		✓	

^a Within the last five years.

^b Fishery was closed or minimal fishing occurred in 2016 therefore effort not assessed.

^c Cost assumptions of crab trap sector and prawn trawl sector in the Shark Bay Blue Swimmer Crab fishery may be applicable to similar fisheries.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Western Australia Department of Primary Industries and personal communication (17/7/18)

Management cost and licence fees

Licence fee data are collected by WAPIRD, and can be made available on request.

Western Australian fisheries do not operate on a full cost recovery basis. Management costs on a per fishery basis are not compiled or reported by WAPIRD.

Average costs per hour for management, enforcement and education, and research and assessment (for total WA fisheries) are publically available in the WAPIRD *Annual report* (Department of Fisheries 2017).

Cost of fishing

The management of the West Coast Rock Lobster Fishery is based on maximum economic yield requiring up to date economic information. Economic data have been collected recently for the Western Rock Lobster Council (AAC 2017). These data could be useful in estimating the cost structure of other Rock Lobster fisheries.

A socio economic assessment of the Shark Bay Blue Swimmer Crab fishery was undertaken by WAPIRD (Daley and van Putten 2018). The study provides cost data for both troll and trap sectors of the fishery.

3.7.2. Aquaculture data

Production

Production data are collected quarterly by WAPIRD for all aquaculture sectors. Annual production figures are reported in Gaughan and Santoro (2018).

Prices

GVP and price data are available for all species where there are at least three active producers.

Table 3-14 Assessment of available aquaculture data, Western Australia

Aquaculture sector	Available data					
	Production	Price	No. active operators	Management costs	Licence fees	Cost of production ^a
Barramundi	✓ ^b	✓ ^b	✓		✓	✓ ^c
Goldfish and European Carp	✓ ^b	✓ ^b	✓		✓	
Ornamental Fish / Invertebrates	✓	✓	✓		✓	
Marron	✓	✓	✓		✓	
Mussels	✓ ^b	✓ ^b	✓		✓	
Pearl Oyster	n.p.	n.p.	n.p.		n.p.	
Rainbow Trout	✓ ^b	✓ ^b	✓		✓	
Silver Perch	✓	✓	✓		✓	
Yabbies	✓	✓	✓		✓	
Algae	n.p.	n.p.	✓		✓	
Other Species	✓	✓	✓		✓	✓ ^c

^a Within the last five years.

^b Low number of operators, therefore a reasonable likelihood data could be confidential for some years.

^c Studies generally relate to marine finfish and may not precisely reflect an aquaculture sector's cost structure.

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: Western Australia Department of Primary Industries and personal communication (17/7/18)

Number of active operators

The number of active operators is collected for all aquaculture sectors. The number of producers are only published if there are at least three producers.

Management cost and licence fees

Licence fee data are collected by WAPIRD and can be made available on request.

Western Australian aquaculture management does not operate on a full cost recovery basis. Management costs on a per fishery basis are not compiled or reported by WAPIRD.

Cost of production

A preliminary feasibility assessment has been undertaken of edible Oyster aquaculture in the Pilbara and Gascoyne regions of Western Australia. The study provides cost data for a 50-60,000 and 100,000 dozen per annum operations (AVC 2016a). Limitations to using this data in relation to Pearl Oyster aquaculture are noted, with the study's findings likely to be applicable to only one Black Pearl producer.

A separate study of the commercial feasibility of aquaculture in the Pilbara and Gascoyne regions was also undertaken (AVC 2016b). The study collected cost data for a generic marine finfish operation, with Yellowfin Tuna, Greater Amberjack and Mahi Mahi identified as specific species of interest.

3.8. Commonwealth Fisheries Data Availability

Commonwealth fisheries data currently available to prepare a fisheries contributions assessment, along with data gaps, are detailed in this section. The information is presented for fisheries only (Section 3.8.1 and Table 3-15) as the Commonwealth does not have the responsibility of managing commercial aquaculture activity.

3.8.1. Fisheries data

Catch

Catch data are collected by species for all fisheries and are available in ABARES *Australian Fishery and Aquaculture Statistics* reports (Mobsby and Koduah 2017). Confidentiality issues exist where the number of active fishers are low. To confidentialise data, fishery catch will need to be aggregated. AFMA confidentiality standards require at least five active fishers per requested data.

Table 3-15 Assessment of available fisheries data, Commonwealth fisheries

	Data availability							
	Catch	Price	Effort	Active vessels	Boat length	Management costs	Licence fees	Cost of fishing ^a
Bass Strait Central Zone Scallop	✓	✓	✓	✓	✓ ^c	✓	✓	
Coral Seas	✓	✓	✓	✓	✓ ^c	✓	✓	
Eastern Tuna and Billfish	✓	✓	✓	✓	✓	✓	✓	✓
Heard Island and McDonald Island	n.p.	n.p.	n.p.	✓	n.p.	✓	n.p.	
High Seas	n.p.	n.p.	n.p.	✓	n.p.		n.p.	
Macquarie Island Toothfish	n.p.	n.p.	n.p.	✓	n.p.	✓	n.p.	
Norfolk Island	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
North West Slope Trawl	n.p.	n.p.	✓	✓	n.p.	✓	n.p.	
Northern Prawn	✓	✓	✓	✓	✓	✓	✓	✓
Skipjack Tuna	n.a.	n.a.	n.a.	n.a.	n.a.	✓	n.a.	n.a.
Small Pelagic	n.p.	n.p.	✓	✓	n.p.	✓	n.p.	
Southern Bluefin Tuna	✓	✓	✓	✓	✓ ^c	✓	✓	
Southern and Eastern Scalefish and S	✓	✓	✓	✓	✓	✓	✓	✓
Southern and Eastern Scalefish and S	✓	✓	✓	✓	✓ ^c	✓	✓	
Southern and Eastern Scalefish and S	✓	✓	✓	✓	✓	✓	✓	✓
Southern Squid Jig	✓	✓ ^b	✓ ^b	✓	✓ ^c	✓	✓ ^b	
South Tasman Rise Trawl	n.p.	n.p.	n.p.	✓	✓ ^c		n.p.	
Small Pelagic	n.p.	n.p.	n.p.	✓	✓ ^c		n.p.	
Torres Strait Finfish	✓	✓	✓	✓			✓	
Torres Strait Prawn	✓	✓	✓	✓	✓	✓	✓	✓
Torres Strait Rock Lobster	✓	✓	✓	✓			✓	
Torres Strait Spanish Mackerel	✓	✓	✓	✓			✓	
Western Deepwater Trawl	n.p.	n.p.	✓	✓	n.p.	✓	n.p.	
Western Tuna Billfish	✓	n.p.	n.p.	✓	n.p.	✓	n.p.	

^a Within the last five years.

^b Data may be not published for some years

^c Data may no longer be accurate (i.e. old data).

Key: ✓ = data available, n.p. = data collected but not published, Blank/grey = No data collected.

Source: ABARES and personal communication (11/7/18)

Prices

GVP data are collected for all Commonwealth managed fisheries and are available in Mobsby and Koduah (2017). Price data are derived from various sources, including fishers and aquaculture farm operators, seafood markets and seafood buyers and processors.

Price/GVP estimates are also subject to confidentiality issue where the number of fishers or buyers are low.

Effort, active vessels and boat length

Days fished and active vessels are collected in log book returns in all fisheries. Similar to catch data, the confidentiality requirement of five active fishers applies.

Boat length data should be available from licencing data, however this may not be regularly updated for some fisheries.

Management cost and licence fees

Licence fee data are collected by AFMA. However, confidentiality issues exists for fisheries with a low number of active fishers.

Not all Commonwealth fisheries operate on a full cost recovery basis. Management costs for those fisheries are not reported by AFMA. ABARES provides fishery management costs data only for those fisheries for which economic indicators are reported.

Cost of fishing

ABARES has produced economic indicator reports, with detailed cost data, for the following fisheries:

- Southern and Eastern Scalefish and Shark Fishery (Bath et al. 2018)
- Eastern Tuna and Billfish Fishery (Bath et al. 2016)
- Northern Prawn Fishery (Bath and Green 2016)
- Torres Strait Prawn Fishery (Skirtun et al. 2015)

The Northern Prawn Fishers Association annually provide a fishery data summary which has comprehensive data, including some cost data and data that could be used to impute costs (Laird 2018).

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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.