



**IDENTIFICATION AND CRITICAL
ASSESSMENT OF RECENT
CONTRIBUTIONS REPORTS
WORKING PAPER 1 - LITERATURE
REVIEW**

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

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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>

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
CGE	Computable General Equilibrium (modelling)
fte	full-time equivalent
GSP	gross state product
GRP	gross regional product
I-O	Input-Output (modelling)
NSW	New South Wales
NT	Northern Territory
PIRSA	Primary Industries and Regions South Australia
QLD	Queensland
RISE	Regional Industry Structure and Employment (impact model)
SA	South Australia
TAS	Tasmania
VIC	Victoria
WA	Western Australia

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Project Manager: Julian Morison

Principal Author/s: Anders Magnusson, Julian Morison, Meagan Magnusson, Lisa Carlin

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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:

1. 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 make to their State/Territory economies;
2. Provide measures of the range of social and economic contributions made by specific, selected fisheries/aquaculture sectors at the regional or product scale; and
3. Develop a robust and nationally-consistent framework to support data collection and estimation of contributions in the future.

The design of the research program procured and/or 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:

1. What fisheries and aquaculture economic contribution/impact 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 National Contributions Project
2. What data are needed to support NCP objective 1 and what data are currently available for use in this project?
3. What are the implications of 1 and 2 for the design of the National Contributions Project?

Part 1 of the review is the subject of this Working Paper (WP1). The aim is to identify and critically assess all the recent contributions/impact reports with a focus on fishing and aquaculture in Australia as well as a selection of key overseas studies. The criteria used to select the relevant reports are summarised in Section 1.2 below.

Part 2 of the review will be the subject of Working Paper 2 (WP2). This will identify and audit existing data sets that can be used to support NCP objective 1, and will identify data gaps. NCP data needs will be developed by the research provider in consultation with the HDR and the NCP Technical Advisory Group. The process of identifying available data will draw on the output of Part 1, but will also involve direct communication with key data managers/custodians in each of the jurisdictions.

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 Advisory Group prior to being presented at a Stakeholder Workshop.

1.2. Preparation of Working Paper 1

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. 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.

A list of criteria against which each study has been assessed was developed by BDO EconSearch in consultation with the HDR and the NCP Technical Advisory Group. The criteria included:

- geography of the fishery and boundaries of economy affected - the primary focus was on Australian studies. For each study, the relevant state/territory was recorded as well as any sub-state analysis. The report is structured on a State/Territory basis with a section for each and an additional section for Commonwealth studies where the subject fisheries are managed by the Australian Fisheries Management Authority (AFMA). A selection of international has also been included.
- parts of the value chain included - the focus of the report is on primary production, i.e. fishing and aquaculture activity. However, many studies include indicators of economic contribution for other segments of the value chain (processing, transport, retail, food service, etc.) and these have been reported as well.
- timeframe of analysis - latest year for which the results and data are reported.
- number of previous studies - some studies are a continuation of a time series of reports or an update of one or more previous studies. In these cases, the number of previous studies is recorded.
- include flow-on/ multiplier/ indirect effects - some studies report direct contribution results only. However, many of the studies referenced also report indirect or flow-on effects.
- analytical method - for those studies reporting indirect effects, the modelling approach used to estimate those effects is reported (e.g. input-output modelling, computable general equilibrium (CGE) modelling)

- use of survey to collect primary data - some studies are based on secondary data only while others also involve collection of primary data through survey of licence holders/ business operators. The conduct of such primary data collection is recorded.
- indicators used - the indicators of economic contribution, such as jobs, GVP, household income and gross regional product, are reported.
- contributions analysis primary (or secondary) purpose of the study - while the primary focus of some studies is to report details of economic contribution, it is a secondary consideration in other studies. This distinction is reported.

2. SUMMARY OF CONTRIBUTIONS REPORTS

2.1. Tasmanian Contributions Reports

The review identified eight reports as providing some information relevant to the contribution of fishing or aquaculture to the Tasmanian economy (Table 2-1). Five of the reports focus on a particular fishery and the remaining two cover several fisheries each. Together, the reports cover six wild catch fisheries and three aquaculture sectors. Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of fisheries and aquaculture production in the state.

Six of the reports were published in the last five years. The most recent data published were for the seafood industry broadly in 2014/15 (TSIC 2017) and for the Tasmanian wild harvest abalone fishery in 2015 (Knuckey & Sen 2017). All reports present results at the state level and one (IPM 2016) also reported results for the Tasman Council LGA.

The only time series data published are for the abalone wild catch fishery (Knuckey & Sen 2017 and Flemingham & van Putten 2009) and for broad categories of seafood production and processing (TSIC 2017). The ABARES report (Mobsby and Koduah 2017) also provides time series data only for broad categories. The remaining reports provide cross-section data.

Reporting the economic contribution of a sector was the primary focus for two of the reports covering wild catch rock lobster (EconSearch 2012) and salmonoid aquaculture (KPMG 2015). The remaining reports were primarily focused on other issues such as fishery management, impact of a development and industry workforce, or had a broader scope such as all agribusiness.

Two reports presented estimates of flow-on economic contributions. Both were focused on salmonoid aquaculture (KPMG 2015 and IPM 2016). The KPMG analysis (2015) used a non-linear input-output model (with marginal coefficients) to model the economic contribution. The model was developed with assistance of the University of Queensland. The IPM analysis (2016) used IPM's proprietary regional input-output model of Tasmania which is not explained further in the report.

The two reports focusing on salmonoid aquaculture presented downstream results for processing and retail (KPMG 2015 and IPM 2016). This is no surprise given the vertically integrated nature of the businesses involved. The two reports focussing on seafood (TSIC 2017) and agri-food (AgriGrowth Tasmania n.d.) also reported results for the seafood processing sector. Both presented flow-on contributions from these downstream activities.

Economic indicators presented in the reports included output, expenditure, household income and gross regional product (or value-added). The two reports that presented flow-on contributions (those focused on salmonoid aquaculture) covered this whole set of indicators and the remaining reports covered only a subset (usually including output or GVP).

Five of the reports used primary data collected through surveys or logbooks as well as secondary data collected from the ABS, ABARES, industry and government departments.

None of the reports reviewed provides comprehensive and recent estimates of the economic contribution of an industry sector to Tasmania. The most recent is for salmonoid aquaculture with 2014/15 data (KPMG 2015). This, and the other fishery specific reports, will provide useful context and starting points for a comprehensive analysis. The *Tasmanian Agri-food Scorecard 2015-16* (AgriGrowth Tasmania n.d.) provides

recent direct output data for primary production and seafood processing. However, wild catch and aquaculture production data are aggregated in the report so cannot be used as a direct input for a comprehensive analysis of economic contribution. The ABARES report (Mobsby and Koduah 2017) provides preliminary output data for 2015-16 by fishery and aquaculture sector.

Table 2-1 Summary of Tasmanian Contributions Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Tasmanian wild harvest abalone fishery for Blacklip (<i>H. rubra</i>) and Greenlip (<i>H. laevigata</i>)	TAS	-	2015	2 (2005 & 2009)	N	-	Y	O, E, HH, GRP	-	Secondary	Knuckey & Sen (2017)
Tasmanian abalone	TAS	-	2008	1 (2005)	N	-	Y	Not specified	-	Secondary	Flemingham & van Putten (2009)
Tasmanian seafood industry: Wild catch - Abalone (blacklip, greenlip), Commercial dive (urchins, periwinkles, clams and seaweed), Giant crab, Rock lobster (Southern rock lobster), Scalefish (various species), Scallop (commercial). Aquaculture - Farmed abalone, Salmonids (Atlantic salmon and ocean trout), Shellfish (Pacific oysters and mussels)	TAS	P	2014/15	-	N	-	Y	O, E, HH	-	Secondary	Tasmanian Seafood Industry Council (2017)
Tasmanian agri-food - section on seafood (pg. 28)	TAS	P	2015/16	9 (since 2004/5)	N	-	N	O	-	Secondary	AgriGrowth Tasmania (n.d.)
Tasmanian Rock Lobster Fishery	TAS	-	2010/11	-	N	-	Y	O, HH	-	Primary	EconSearch (2012)
Tasmanian Atlantic salmon and Ocean trout aquaculture industry	TAS	Vertically integrated	2013/14	-	Y	I-O (marginal coefficients)	Y	O, E, HH, GRP	-	Primary	KPMG (2015)
Salmonid aquaculture	Tasman Council LGA, TAS	P, R	2013/14	-	Y	I-O	N	O, E, HH, GRP	-	Primary	IPM (2016)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby and Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Costs.

2.2. South Australian Contributions Reports

The review identified eleven reports as providing some information relevant to the contribution of fishing or aquaculture to the economy (Table 2-2). Ten of the reports focus on a particular wild catch fishery and the eleventh report covers aquaculture production of eight species. The primary purpose of each report is to present economic indicators including the economic contribution of a sector and other indicators. Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of fisheries and aquaculture production in the state.

A 2016/17 edition of each report was published in 2018. All reports present results at the state level and the relevant regional level for the subject fishery or species. Sub-state level regions used for analysis vary in scale depending on geographical. The sub-state regions used for analysis include:

- Fleurieu and Kangaroo Island
- Murray and Mallee
- Eyre and Western
- Yorke Peninsula
- Limestone Coast
- Spencer Gulf and Coffin Bay
- Gulf St. Vincent and Kangaroo Island
- West Coast
- Eyre Peninsula
- Yorke Peninsula
- Kangaroo Island
- Adelaide and Hills
- Murraylands and South East

Each of the eleven reports is one in a series covering almost two decades. Most of the reports provide the nineteenth annual report in a series, the shortest series is seven years. The ABARES report (Mobsby and Koduah 2017) provides time series data for broad categories only.

Each report presents estimated flow-on contributions using regional versions of the BDO EconSearch RISE model (EconSearch 2017). The model is based on regional I-O tables and a method of analysis that addresses the key limitations of traditional I-O analysis.

Each report presents downstream results for processing, transport, retail and food service. Flow-on economic contributions are also reported for each of these downstream activities.

Economic indicators presented in each report include output, expenditure, household income and gross regional product. Direct and flow-on effects are reported separately for each.

The ten fisheries reports are each based on primary survey data and secondary data from government departments and the ABS. Each fishery is surveyed every three years and more reliance is placed on secondary data to update the indicators in the non-survey years. The aquaculture report is based on production return data provided by producers to the state government each year.

Each of the eleven reports provides a recent and comprehensive assessment of the economic contribution of a fishery or aquaculture sector. These reports will provide usable employment, expenditure, catch/production and GVP data for a comprehensive economic contribution assessment. The range of indicators, stages of value chain and inclusion of flow-on effects included in these reports demonstrates a useful and realistic method for a comprehensive assessment. The ABARES report (Mobsby and Koduah 2017)

provides preliminary output data for 2015-16 by fishery and aquaculture sector, including some for fisheries not covered by the fishery specific reports.

DAE (2017) provides a comprehensive assessment of the total contribution that the South Australian marine environment and marine industries make to the economy. While it draws on the EconSearch results for the commercial fishing (SA managed wild catch fisheries) and marine-based aquaculture sectors for 2015/16, it also provides estimates for Commonwealth managed wild catch fisheries and a range of other marine industries or activities based on the marine environment. These include:

- Recreational fishing
- Offshore oil and gas exploration
- Marine tourism
- Shipbuilding and boatbuilding
- Water transport (encompassing freight and passenger transport)
- Marine equipment retailing
- Marina operation.

The report provides a regional breakdown of direct economic activity in terms of GVP or value of output for most marine industries, although activity in the recreational fishing and offshore oil and gas exploration sectors was reported as expenditure. Direct economic contribution was reported for four regions where relevant (West Coast, Spencer Gulf, Gulf St Vincent & Kangaroo Island, and South East Coast) and for SA as a whole. Estimates of indirect economic contribution were provided for the Spencer Gulf region and SA.

Table 2-2 Summary of South Australian Contributions Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Gulf St Vincent (GSV) Prawn Fishery	SA	P, T, R, FS	2016/17	15 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018a)
Lakes and Coorong Fishery	Fleurieu and Kangaroo Island (KI), Murray and Mallee, SA	P, T, R, FS	2016/17	15 since 2002/03	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018b)
SA Abalone Fishery	Eyre and Western, Yorke Peninsula, Limestone Coast, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018c)
SA Sardine Fishery	Eyre and Western, SA	P, T, R, FS	2016/17	16 since 2001/02	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018d)
SA Charter Boat Fishery	Spencer Gulf & Coffin Bay, GSV & KI, SA	-	2016/17	8 since 2009/10	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018e)
SA Blue Crab Pot fishery	SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018f)
Marine Scalefish Fishery	West Coast, Spencer Gulf and Coffin Bay, GSV & KI, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018g)
Northern Zone Rock Lobster Fishery	Eyre and Western, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018h)
Southern Zone Rock Lobster Fishery	Limestone Coast, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018i)
Spencer Gulf Prawn Fishery	Eyre and Western, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	Social	Primary	EconSearch (2018j)
Commercial Fisheries	West Coast, Spencer Gulf, GSV & KI, South East, SA	-	2015/16	-	Y	I-O	N	GVP, VA, E	-	Primary	DAE (2017)

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
SA Aquaculture (Southern Bluefin Tuna)	Eyre Peninsula, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Marine Finfish)	Eyre Peninsula, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Oysters)	Eyre Peninsula, West Coast, Yorke Peninsula, Kangaroo Island (KI), SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Mussels)	Eyre Peninsula, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Abalone)	Eyre Peninsula, West Coast, KI, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Freshwater Finfish)	Yorke Peninsula, KI, Adelaide and Hills, Murraylands and South East, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Marron and Yabbies)	Eyre Peninsula, Yorke Peninsula, KI, Adelaide & Hills, Murraylands & South East, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
SA Aquaculture (Other)	Eyre Peninsula, Adelaide & Hills, Murraylands & South East, SA	P, T, R, FS	2016/17	20 since 1997/98	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2018k)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby and Koduah (2017)
Marine-based Aquaculture	West Coast, Spencer Gulf, GSV & KI, South East, SA	-	2015/16	-	Y	I-O	N	GVP, VA, E	-	Primary	DAE (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Costs, VA = Value Added.

2.3. New South Wales Contributions Reports

The review identified eight reports as providing some information relevant to the contribution of fishing or aquaculture to the NSW economy (Table 2-3). Five of the reports focus on wild catch fisheries and two cover aquaculture sectors. Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of both fisheries and aquaculture production in the state.

Six of the reports were published in the last five years. The most recent data published were for the seafood industry broadly in 2015/16 (Mobsby and Koduah 2017). Other recent data published were for the seafood industry in 2012/13 (Voyer et al. 2016 and WRI (2016a)) and for the aquaculture industry in 2013/14 (Barclay et al. (2016) and WRI (2016b)). All reports present results at the state level and four of the studies report regional data as well.

The only time series data published are for the broad categories of seafood production/species used by ABARES (Mobsby and Koduah 2017), although Harrison (2010) and EconSearch (2013) update earlier studies. The remaining reports provide cross-section data.

Reporting the economic contribution of a sector was the primary focus for four of the reports covering both the wild catch and aquaculture sectors. The remaining three reports were primarily focused on other issues such as fishery management, financial performance of individual businesses and the marine environment.

Four reports presented estimates of flow-on economic contributions (Voyer et al. (2016), Harrison (2010), Barclay et al. (2016) and WRI (2016)), all of which used either regional or state level input-output models to estimate the economic contribution. The four reports also provided estimates of downstream impacts, although in each in aggregate rather than by individual sector. SMEC (2001) reported fishing industry multipliers (output, household income and employment) but only to describe the relative strength of economic linkages the fishing industry has with the regional economy, rather than to quantify the absolute contribution of the industry.

In each of the four reports that quantified flow-on effects, estimates of output, employment, household income and gross regional product (or value-added) were provided.

Six of the reports used primary data collected through surveys or logbooks as well as secondary data collected from the ABS, ABARES, industry and government departments.

None of the reports reviewed provides comprehensive and recent estimates of the economic contribution of an industry sector to NSW. The most recent is for the aquaculture sector with 2013/14 data (Barclay et al. (2016) and WRI (2016)) and for the wildcatch sector with 2012/13 data (Voyer et al. 2016). These and the other fishery specific reports, will provide useful context and starting points for a comprehensive analysis. Mobsby and Koduah (2017) provides recent direct output data for primary production. Wild catch and aquaculture production data are provided separately in the report could be used as a direct input for a comprehensive analysis of economic contribution.

Table 2-3 Summary of New South Wales Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
NSW professional wild-catch fishing industry (Abalone, Lobster, Estuary Prawn Trawl, Estuary General, Ocean Trap and Line, Ocean Hauling, Ocean Trawl, Southern Fish Trawl, Inland, Sea Urchin and Turban Shell)	NSW Coastal region: Far North Coast, Clarence, Mid North Coast, Great Lakes, Central Coast, Sydney Metro, Illawarra, South Coast, NSW	Aggregate processing & dist'n	2012/13	-	Y	I-O	Y	O, E, HH, GRP	Social	Primary	Voyer <i>et al.</i> (2016) includes Appendix 5: Western Research Institute (2016a)
NSW fishing cooperatives	NSW	-	Not specified	1 (1996)	N	-	Y	NA	-	Secondary	GHD (2014)
Estuary General Fishery	NSW	-	1999/00	-	Y	I-O	N	O, E, HH	-	Secondary	SMEC (2001)
Ballina, Lower Clarence and Coffs Harbour commercial fisheries	Ballina, Lower Clarence and Coffs Harbour, NSW	R, M	2008/09	1 (1995)	Y	I-O	Y	O, E, HH, GRP	-	Primary	Harrison (2010)
NSW Abalone Fishery	NSW	-	2011/12	1 (2005)	N	-	Y	GVP, MC	-	Secondary	EconSearch (2013)
Ocean Trawl, Estuary General, Ocean Hauling, Ocean Trap and Line, Estuary Prawn Trawl	NSW	-	2011/12	-	N	-	Y	GVP	-	Secondary	AgEconPlus (2015)
Coastal aquaculture (Oysters, prawns/yabbies, finfish, hatchery, mulloway and Other)	NSW Coastal region: North Coast, Mid North and Central Coasts, South Coast, NSW	R, P	2013/14	-	Y	I-O	Y	O, E, HH, GRP	Social	Primary	Barclay <i>et al.</i> (2016)
Aquaculture Industry in NSW	North Coast, Mid North Coast, South Coast, NSW	R,P	2013/14	-	Y	I-O	Y	O, E, HH, GRP	-	Primary	Western Research Institute (2016b)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby & Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Costs.

2.4. Victorian Contributions Reports

The review identified eleven reports as providing some information relevant to the contribution of fishing or aquaculture to the economy (Table 2-4). Five of the reports focus on individual wild catch fisheries and five focus on different aquaculture sectors. Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of both fisheries and aquaculture production in the state.

Only one of the reports was published in the last five years (EconSearch and Roberts Evaluation 2014). Although a comprehensive contributions analysis, including separate analyses for the fishing, processing, retail and food service sectors, the fisheries themselves were regionally based (East Gippsland).

The other four reports which focused on wild catch fisheries (EconSearch 2010, 2011a-c) were limited to reporting GVP and management costs. Each of those four reports, however, also reported average fishing costs (variable and fixed) for licence holders in each fishery. These expenditure data are particularly useful for estimating flow-on effects in contributions studies, although were not used for that purpose in these reports.

Similarly, the five reports which focused on aquaculture sectors (EconSearch 2011d-h) were also limited to reporting GVP and management costs. In each of those five reports, average costs of production (variable and fixed) for operators in the respective aquaculture sectors were also reported. As with the fisheries cost data, these aquaculture sector expenditure data are also useful for estimating flow-on effects in contributions studies.

Although not directly usable, this set of fishing and aquaculture reports will provide useful context and starting points for a comprehensive analysis in Victoria. Mobsby and Koduah (2017) provides recent direct output data for primary production. Wild catch and aquaculture production data are provided separately in the report could be used as a direct input for a comprehensive analysis of economic contribution.

Table 2-4 Summary of Victorian Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Victorian Rock Lobster Fishery	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2010)
Victorian Abalone Fishery	VIC	-	2008/09	-	N	-	Y	O, HH, MC	-	Secondary	EconSearch (2011a)
Victorian Bay and Inlet Fisheries	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2011b)
Victorian Scallop Fishery	VIC	-	2008/09	1 (2008)	N	-	Y	NA	-	Secondary	EconSearch (2011c)
Southern and Eastern Scalefish and Shark Fishery (SESSF) Gillnet, Hook and Trap Sector	East Gippsland, VIC	P, R, FS	2012/13	-	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch & Roberts Evaluation (2014)
SESSF Commonwealth Trawl Sector	East Gippsland, VIC	P, R, FS	2012/13	-	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch & Roberts Evaluation (2014)
Victorian Abalone Aquaculture	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2011d)
Victorian Blue Mussel Aquaculture Production	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2011e)
Victorian Eel Aquaculture	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2011f)
Victorian Murray cod aquaculture	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2011g)
Victorian Rainbow Trout Aquaculture	VIC	-	2008/09	-	N	-	Y	NA	-	Secondary	EconSearch (2011h)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby and Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Costs

2.5. Northern Territory Contributions Reports

Two reports were identified as providing some information relevant to the contribution of fishing and aquaculture to the NT economy (Table 2-5). EconSearch (2018l) focuses on eight wild catch fisheries (including an aggregate ‘Other’ fisheries) and an aggregation of aquaculture activity in the Territory. Mobsby and Koduah (2017) provides overview data on the quantity and value of fisheries and aquaculture production.

The latest data presented in both EconSearch (2018l) and Mobsby and Koduah (2017) are for 2015/16. The EconSearch report provides estimates for a 10-year period whereas Mobsby and Koduah (2017) provides value of production data for 2015/16 only, with production data dating back to 2005/06. ABARES gross value of production data are available for earlier years in earlier editions of this annually produced report.

Reporting the economic contribution of fishing and aquaculture in the NT was the primary focus for the EconSearch (2018l) report. The Mobsby and Koduah (2017) report was primarily focused on high level reporting for Australia in total and comparable data at a state level. The EconSearch (2018l) report focusses on individual fisheries whereas the Mobsby and Koduah (2017) report provides data for individual fish species.

The EconSearch (2018l) report includes flow-on data using gross state product (value added) and employment and the main indicators. The analysis used a proprietary input-output model for the NT to model the economic contribution. The model was developed internally by EconSearch.

Although the format and detail in the EconSearch (2018l) report would make it valuable for the national contributions study, the expenditure data were wholly based on estimates (rather than survey); there was no collection of financial information from commercial fishers or from aquaculture operators. Without financial data from a survey of licence holders, the preparation of economic contribution indicators utilised various secondary data sources (catch, GVP, licence counts, days fished, active boat numbers, vessel length and licence fees) in conjunction with financial data collected for other “like fisheries”.

An economic analysis based on derived data will be subject to additional uncertainty. Some of the factors relevant in the NT EconSearch study being:

- degree of similarity between NT fisheries and other “like fisheries”
- the extent of capital use across fisheries (i.e. boats registered under multiple licences)
- the quality of input indicators.

Specific to the first point, NT fisheries and other “like fisheries” (which exhibit better data availability) may differ significantly in cost structure. Although sensitivity may be reduced by choosing a very similar fishery (in terms of gear usage and target species) and controlling for capital and effort inputs (e.g. via boat size and days fished), there may be other unobserved factors such as geography or climate not appropriately accounted for. This was an issue regarding aquaculture in particular, which was based on hypothetical finfish and oyster (consumption) operations.

Second is the issue of adjusting for cross fishery uses of capital. Some commercial fishers may hold multiple licences for different fisheries utilising the same capital such as boats and gear. As a result, any fixed cost estimates will have to be adjusted subject to the degree of capital usage in the specific fishery. For example, if a fishing boat is only used 50 per cent in the Barramundi fishery, then only half of the estimated depreciation, administration, etc. costs should be attributed to barramundi fishing.

Although DPIR provided data indicating the number of boats registered under multiple commercial licences, there is no information relating to the decomposition of the fishing effort across different fisheries. Furthermore, this information was only obtainable for 2015 (calendar year). Given the lack of information, a standard assumption that boats registered under multiple fishing licences work at average levels of effort for each fishery was used. Arguably such boats may fish less days than the fishery average, and hence this method may over attribute capital usage to other fisheries.

Finally, the quality of the provided data is also a potential source of uncertainty in economic analysis. In addition to the accuracy of data, there is also issue regarding the fit of geographic regions and the timeframe of data.

For the purpose of estimating economic indicators for this report, the Pearl Oyster and Barramundi sectors were considered to be the only contributors to NT aquaculture. In addition to not capturing the full extent of NT aquaculture, the aggregated value (and resulting lack of production quantities) introduced additional complications in imputing economic data.

Table 2-5 Summary of Northern Territory Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Coastal Line Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Spanish Mackerel Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Offshore Net and Line Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Demersal Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Barramundi Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Mud Crab Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Timor Reef Fishery	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Other fisheries	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
Aquaculture	NT	P, R, FS	2015/16	-	Y	I-O	N	O, GRP, E	-	Primary	EconSearch (2018l)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby and Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Cost

2.6. Queensland Contributions Reports

The review identified three reports (Pascoe et al. (2016), MJA (2014) and DAE (2013)) as providing some information relevant to the contribution of fishing or aquaculture to the Queensland economy (Table 2-6). Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of fisheries and aquaculture production in the state.

Pascoe et al. (2016) considered Queensland's inshore commercial fisheries, MJA (2014) focused on the trawl, pot and net wild catch fisheries while the focus of DAE (2013) was on the broader wild catch and aquaculture sectors. Mobsby and Koduah (2017) does provide greater disaggregation by species, with GVP reported for the Prawns, Coral Trout, Lobster, Crabs and other species in the wild catch fishing sector and Prawns, Barramundi and other species in the aquaculture sector.

Only Mobsby and Koduah (2017) and Pascoe et al. (2016) have a whole of Queensland focus. MJA (2014) reports on the Capricorn and Curtis Coast regions and DAE (2013) is concerned about the Great Barrier Reef region (Gladstone to Thursday Island).

Although all four reports were published in the last five years, MJA (2013) reports on the value of commercial fishing activity in 2005 and the DAE (2014) reference year is 2010/11. The most recent data published were for the seafood industry broadly in 2015/16 (Mobsby and Koduah 2017), while the Pascoe et al (2016) analysis was for 2013/14. DAE (2014), Pascoe et al (2016) and Mobsby and Koduah (2017) present results at the state level, whereas MJA (2013) reported results only at the regional level.

The only time series data published are for the broad categories of seafood production/species used by ABARES (Mobsby and Koduah 2017). The remaining reports provide cross-section data.

Reporting the economic contribution of a sector was the primary focus for DAE (2013), although this was just one element of the economic contribution of the Great Barrier Reef (others being tourism, recreational fishing and boating, and scientific research and management). Pascoe et al (2016) was also primarily concerned with economic contribution, including the perspective of consumers (the value to consumers of buying locally (Queensland) caught seafood. MJA (2014) was primarily focused on the broader economic implications of protecting environmental values.

Only two of the reports (DAE (2013) and Pascoe et al (2016)) presented estimates of flow-on economic contributions. There was no explicit consideration of processing, transport, retail or other downstream activity in the DAE analysis in which they used an input-output model to estimate the economic contribution. The model was developed internally by DAE. Pascoe et al. (2016) developed an alternative method to input-output analysis to estimate regional and industry specific multipliers. The method, a shortcut I-O approach, was based on cost shares and location of expenditure, both derivable from a survey of key industries

Economic indicators presented in the DAE (2013) report included output, expenditure, household income and gross regional product (or value-added). Pascoe et al. also produced estimates of gross regional product (value added) as well as estimates of willingness to pay by consumers.

None of the reports reviewed provides comprehensive and recent estimates of the economic contribution of an industry sector to Queensland. Because of the regional focus and age of the data reported in MJA (2014) and DAE (2013), neither report will provide useful starting points for a comprehensive analysis. Pascoe et al. (2016) does report more recent estimates (2013/14) for inshore fisheries, although they are limited



to gross value added. Mobsby and Koduah (2017) provides recent (2015/16) direct output data for primary production. Wild catch and aquaculture production data are provided separately in the report and could be used as a direct input for a comprehensive analysis of economic contribution.

Table 2-6 Summary of Queensland Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Commercial fishing operating out of the Great Barrier Reef region	Great Barrier Reef catchment, including North Burnett, Gladstone, Townsville, Charters Towers, Cairns and the Tablelands, QLD	Not specified	2012	-	Y	I-O	N	O, E, HH, GRP	-	Secondary	Deloitte Access Economics (2013)
Capricorn and Curtis Coast region commercial fishing	Capricorn and Curtis Coast regions, QLD	-	2005	-	N	NA	N	O	-	Secondary	Marsden Jacob Associates (2014)
Aquaculture operating out of the Great Barrier Reef region	Great Barrier Reef catchment, including North Burnett, Gladstone, Townsville, Charters Towers, Cairns and the Tablelands, QLD	Not specified	2012	-	Y	I-O	N	O, E, HH, GRP	-	Secondary	Deloitte Access Economics (2013)
Qld inshore commercial fisheries	QLD	R	2013/14	-	Y	I-O (shortcut)	Y	GRP	Consumer willingness to pay	Primary	Pascoe et al. (2016)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby and Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Cost

2.7. West Australian Contributions Reports

The review identified two reports (AAC (2017) and McLeod & McGinley (n.d.)) as providing some information relevant to the economic contribution of the fishing industry to the West Australian economy (Table 2-7). Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of fisheries and aquaculture production in the state.

AAC (2017) focused on the Rock Lobster fishery while the McLeod & McGinley (n.d.) report covered the broader wild catch sectors. As with the reporting for most other jurisdictions, Mobsby and Koduah (2017) does provide greater disaggregation by species, with GVP reported for Rock Lobster, Prawns and other species in the wild catch fishing sector, and Pearls and other farmed species in the aquaculture sector.

Mobsby and Koduah (2017) had a whole of WA focus as did McLeod & McGinley (n.d.). AAC (2017) reported at the state level as well but also had a section detailing contribution in the northern and southern zones of the Rock Lobster fishery, and for nine individual communities across the two zones.

Of the three reports, ACC (2017) published the most recent data (2016/17) followed by Mobsby and Koduah (2017) which provided data for 2015/16. McLeod & McGinley (n.d.) is very outdated being for 1991/92. Each of the reports provided at least five years' time series data, although in each case only for GVP.

Reporting the economic contribution of a sector was the primary focus for both ACC (2017) and McLeod & McGinley (n.d.) and both of these reports presented estimates of flow-on effects. ACC (2017) provided explicit consideration of processing, transport, tourism and boat building, whereas McLeod & McGinley (n.d.) provided no estimates of the economic contribution associated with downstream activity.

Both ACC (2017) and McLeod & McGinley (n.d.) used input-output analysis to estimate the economic contribution. Output, employment and household income were reported in McLeod & McGinley (n.d.) and value added and employment in ACC (2017). As noted earlier, the only financial indicator reported by Mobsby and Koduah (2017) is GVP.

ACC (2017) collected data through an industry consultation process (15 individuals in total) which included five fishers and four processors. Secondary data were collected from a variety of sources including the ABARES, industry reports and government departments. McLeod & McGinley (n.d.) used a formal survey of fishers. Over 100 useable responses were received representing around 15 per cent of active licences at the time.

ACC (2017) provides a comprehensive and recent estimates of the economic contribution of the Rock Lobster industry to WA. For this reason, it will provide a useful starting point for a comprehensive economic contributions analysis in WA. Mobsby and Koduah (2017) provides recent direct output data for primary production. Wild catch and aquaculture production data provided separately in the report could be used as a direct input for a comprehensive analysis of economic contribution. McLeod & McGinley (n.d.) would not be useful for a more comprehensive analysis primarily because of the age of the data. As well, the method used is a standard approach and provides no particular insights that are not available from the many other reports of its type.

Table 2-7 Summary of West Australian Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Western Rock Lobster Fishery (WA)	Area along WA's coast between Shark Bay and Cape Leeuwin. Results reported separately for Northern and Southern Zones and 9 communities across those zones and for WA as a whole.	P, T, E	2016/17	-	Y	I-O	Y	O, E, HH, GRP	-	Primary	ACIL Allen Consulting (2017)
West Coast Rock Lobster fishery	Kimberley, Pilbara, Gascoyne, Central, Midlands, Metropolitan, South West, Upper Great Southern, Lower Great Southern & South Eastern - WA	-	1991/92	-	Y	I-O	Y	O, E, HH	-	Primary	McLeod & McGinley (n.d.)
WA pearling industry	As above	-	1991/92	-	Y	I-O	Y	O, E, HH	-	Primary	McLeod & McGinley (n.d.)
Exmouth Gulf, Shark Bay and Nickol Bay prawn fisheries	As above	-	1991/92	-	Y	I-O	Y	O, E, HH	-	Primary	McLeod & McGinley (n.d.)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby & Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Cost

2.8. Commonwealth Contributions Reports

The review identified seven reports as providing some information relevant to the contribution of fishing or aquaculture to the Australian economy (Table 2-8). Five of the reports focus on individual wild catch fisheries. Additionally, the ABARES report (Mobsby and Koduah 2017) provides overview data on the quantity and value of both fisheries and aquaculture production in the state. Apart from ARE (1999), each of the reports involved primary data collection (i.e. financial surveys of licence holders).

All bar one of the reports (ARE 1999) was published in the last five years. However, only one of the reports (EconSearch 2014) had as its primary purpose the estimation of economic contribution. Although EconSearch (2014) is a comprehensive contributions analysis, including separate analyses for the fishing, processing, retail and food service sectors, the fisheries themselves were regionally based (East Gippsland). That is, the report did not provide estimates for whole fisheries but for boats that either operated out of Lakes Entrance or landed catch for processing in Lakes Entrance.

The other four wild catch fisheries reports (Bath et al. (2018), Bath & Green (2016), Bath et al. (2016) and Skirtun (2015)) were limited to reporting GVP and management costs. Each of those four reports, however, also reported average fishing costs (variable and fixed) for licence holders in each fishery. These expenditure data are particularly useful for estimating flow-on effects in contributions studies, although were not used for that purpose in these reports.

This set of four wild catch fishing reports will provide useful context and starting points for a comprehensive analysis of Commonwealth fisheries. As well as recent GVP, management cost and cost of fishing data, there are also lengthy time series available for each of these data fields.

Mobsby and Koduah (2017) provides recent direct output and GVP data for wild catch fisheries. These data could be used as direct input for a comprehensive analysis of economic contribution. Note that all aquaculture value and production is reported at a state and territory level; none is reported for the Commonwealth.

As noted above, EconSearch (2014) reported on economic contribution along the value chain (fishing, processing, retail and food service). None of the other six reports provided any value chain data. Although relatively comprehensive use in a regional setting, the EconSearch (2014) report will be of limited use in a comprehensive analysis of economic contribution due to the regional (and therefore partial) focus of the report.

It is worth mentioning that ABARES undertook five detailed assessments of the economic impacts on regional fishing communities from the creation of Commonwealth marine reserves (ABARES 2012a-e). These were not economic contribution studies but, using a CGE modelling framework, reported the impacts on key economic variables at the regional, state and national levels. Economic impacts were reported in terms of changes in gross domestic product, employment and industry activity levels at the national, state and subregional levels. A detailed description of the AusRegion modelling framework is provided in ABARES (2010).

Table 2-8 Summary of Commonwealth Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Commonwealth Bass Strait Central Zone Scallop fishery (proportion operating out of Lakes Entrance VIC)	East Gippsland, VIC	P, R, FS	2012/13	-	Y	I-O	Y	O, E, HH, GRP	-	Primary	EconSearch (2014)
Southern and Eastern Scalefish and Shark Fishery (SESSF)	Stretches from Sydney southward around Tasmania to Cape Jervis in SA, where it abuts the Great Australian Bight Trawl Sector, NSW, VIC & SA	-	2017	11	N	-	Y	GVP	-	Secondary	Bath <i>et al.</i> (2018)
Northern Prawn Fishery	Located off the northern coast of Australia, from Cape Londonderry in WA to Cape York Peninsula in Queensland, WA & QLD	-	2015	12	N	-	Y	GVP	-	Secondary	Bath and Green (2016)
Eastern Tuna and Billfish Fishery	Located along the east and south coast of Australia, stretching from the tip of Cape York to the Victoria-SA border and includes the waters around Lord Howe Island and Norfolk Island, QLD, NSW, VIC, SA	-	2014	12	N	-	Y	GVP	-	Secondary	Bath <i>et al.</i> (2016)

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Torres Strait Prawn Fishery	Operates in the eastern part of the Torres Strait Protected Zone (TSPZ) and south of the TSPZ, in Queensland waters defined as the 'outside but near area', QLD	-	2013	12	N	-	Y	GVP	-	Secondary	Skirtun <i>et al.</i> (2015)
Australian Prawn Industry	National focus with case studies of Townsville NSW and Clarence River Region QLD/NSW	-	1996/97	-	N	-	N	GVP	-	Secondary	Alliance Resource Economics (1999)
State and Commonwealth commercial fisheries & aquaculture sectors	Australia, each state and NT	-	2015/16	25	N	-	Y	GVP	-	Secondary	Mobsby and Koduah (2017)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Cost

2.9. International Contributions Reports

The review identified eight reports with a primary purpose of estimating the contribution of fishing or aquaculture to national economies (Table 2-9), international reports with a different primary purpose were not reviewed. Each reviewed report covered multiple species in the relevant wild catch or aquaculture sector with the exception of one, which focused on international tuna fisheries (Terawasi and Reid (2017)).

None of the reports described the inclusion of primary data in the analysis, though some involved interviews with key contacts to verify the secondary data sources. Secondary data for the reports were sourced from: administrative fisheries and aquaculture data held by government; fisheries survey and industry data collaborated into public databases; and other national statistics, labour and economics agencies in the respective countries.

Three of the reports provide data from within the last five years: Alaska commercial seafood (McDowell Group 2017), international tuna fisheries (Terawasi and Reid 2017), European Union Aquaculture (Bostock et al. 2016). The Alaska commercial seafood (McDowell Group 2017), U.S. commercial harvest (National Marine Fisheries Service 2011) and international tuna fisheries (Terawasi and Reid 2017) reports each formed part of a time series of reports. The remaining reports present cross-sectional data from longer than five years ago.

Two reports focused on an international region: tuna fisheries of the western and central Pacific Ocean (Terawasi and Reid 2017), European Union Aquaculture (Bostock et al. 2016). The remaining reports focused on a national region (two focused on Alaska but reported contributions to the whole of the U.S. (McDowell Group 2017 and Waters and Seung 2010)).

Flow-on contributions were presented in six of the reports. Half used traditional I-O analysis based upon national I-O tables (FAI 2002, Heen 2001 and Grealis et al. 2017). The Alaska commercial seafood (McDowell Group 2017) and U.S. Commercial harvest (National Marine Fisheries Service 2011) reports used the IMPLAN platform, an I-O model of the U.S. augmented with a social accounting matrix.

Economic indicators presented by the reports included output, employment, household income and gross regional product. Each report presented results for all, or almost all, of these indicators.

In addition to primary production, the Alaska commercial seafood (McDowell Group 2017) and U.S. Commercial harvest (National Marine Fisheries Service 2011) reports presented results for processing, distribution, retail and food service (including flow-on effects). The Norwegian report (Heen 2001) presented economic indicators for processing, also including flow-on effects.

The reports reviewed here present a range of methodologies that have been used to successfully describe the economic contribution of fisheries internationally.

Table 2-9 Summary of International Contribution Reports

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
Alaska's commercial seafood industry	Arctic-Yukon-Kuskokwim, Bristol Bay, Southcentral, BSAI, Kodiak, Southeast, Alaska, United States	P, D, R, FS	2015/16	2 (2013 & 2015)	Y	I-O : IMPLAN (I-O paired with regional social accounting matrices (SAMs))	N	O, E, HH, GRP	-	Primary	McDowell Group (2017)
The U.S. commercial harvest sector	North Pacific, Pacific, Western Pacific, New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, United States	P, D, R, FS	2010	5 (since 2001)	Y	I-O : IMPLAN (I-O paired with regional social accounting matrices (SAMs))	N	O, E, HH, GRP	-	Primary	National Marine Fisheries Service (2011)
Tuna Fisheries of the Western and Central Pacific Ocean	Western and Central Pacific Ocean (Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu)	NA	2016	10	N	NA	N	HH, GRP	Development	Primary	Terawasi and Reid (2017)
Alaskan fisheries	Alaska, United States	Not specified	2008	-	Y	CGE	N	O, E, HH	-	Primary	Waters and Seung (2010)

Fishery(s)/aquaculture sector(s)	Region, state, country	Value chain ^a	Latest yr of contribution	No. of previous studies	Flow-on	Flow-on estimation Method	Survey	Economic indicators ^b	Other indicators	Contribution analysis main purpose?	Author (date)
UK Dermasal fisheries	United Kingdom	Not specified	2002	-	Y	I-O	Not specified	O, E, HH, GRP	-	Primary	FAI (2002)
UK Shellfish fisheries	United Kingdom	Not specified	2002	-	Y	I-O	Not specified	O, E, HH, GRP	-	Primary	FAI (2002)
UK Pelagic fisheries	United Kingdom	Not specified	2002	-	Y	I-O	Not specified	O, E, HH, GRP	-	Primary	FAI (2002)
Scottish Dermasal fisheries	Scotland	Not specified	2002	-	Y	I-O	Not specified	O, E, HH, GRP	-	Primary	FAI (2002)
Scottish Shellfish fisheries	Scotland	Not specified	2002	-	Y	I-O	Not specified	O, E, HH, GRP	-	Primary	FAI (2002)
Scottish Pelagic fisheries	Scotland	Not specified	2002	-	Y	I-O	Not specified	O, E, HH, GRP	-	Primary	FAI (2002)
Northern Norwegian fisheries	North Norway	P	1993/99	-	Y	I-O	N	O, E, GRP	-	Primary	Heen (2001)
Northern Norwegian aquaculture	North Norway	P	1993/99	-	Y	I-O	N	O, E, GRP	-	Primary	Heen (2001)
Irish Aquaculture sector	Ireland	Not specified		-	Y	I-O	N	O, E	-	Primary	Grealis <i>et al.</i> (2017)
EU aquaculture	EU	None	2012	-	N	Review paper	N	O, E, GRP	-	Primary	Bostock <i>et al.</i> (2016)

^a Value Chain: P = Processors, T = Transport, R = Retail, FS = Food Services, D = Distributors, E = Exporters.

^b Indicators: O = Output, E = Employment, HH = Household Income, GRP = Gross Regional Product, GVP = Gross Value of Production, MC = Management Costs

3. SUMMARY OF KEY USABLE REPORTS

Several reports discussed in Section 2 stand out as providing recent and relevant data that could be used directly in a comprehensive national contributions study. These reports present data from 2013 or later on catch, GVP, employment or business cost structures. This section briefly summaries these reports.

ABARES - Australian fisheries and aquaculture statistics 2016 (Mobsby and Koduah 2017)

This report presents catch and GVP data for the key species in the wild catch and aquaculture industries in each state. The reports are part of an annual time series with 25 reports, the most recent data being for the 2015/16 financial year. While results are reported by species in this report, it will provide useable direct data for a national contributions study, particularly for single species fisheries. For multi-species fisheries it may provide usable direct data for some states, but further analysis is likely to be required.

ABARES - Australian fisheries economic indicators reports (Bath et al. 2018, Bath and Green 2016, Bath et al. 2016 and Skirtun et al. 2015)

These five reports were published by ABARES in the last five years, presenting data for years between 2013 and 2017 for four commonwealth fisheries (see Section 2.8). Each report forms part of a time series. These fishery specific reports will provide useful direct data for a national contributions study for each of the four fisheries.

Economic and Social Indicators for the South Australian Commercial Fisheries (EconSearch 2017 a-j)

Each of the ten reports provides a recent and comprehensive assessment of the economic contribution of a fishery to South Australia over time. These reports will provide usable direct employment, expenditure, catch and GVP data for a comprehensive economic contribution assessment. The range of indicators, stages of value chain and inclusion of flow-on effects included in these reports demonstrates a useful and realistic method for a comprehensive assessment.

The Economic Impact of Aquaculture on the South Australian State and Regional Economies (EconSearch 2018k)

This report presents employment, expenditure, production and GVP data for several categories of aquaculture in South Australia over time. It also presents indicators of economic contributions to South Australia and the relevant regions for each category. The report will provide usable production and GVP data for a national contributions study.

Economic Contribution of the Western Rock Lobster Industry 2017 (ACIL Allen Consulting 2017)

This report presents recent and relevant data for the Western Rock Lobster Fishery, including direct employment, expenditure, catch and GVP. The report also describes the associated downstream supply chain. For these two reasons the report will provide usable data and a relevant framework as part of a national contributions study.

Economic Impact Assessment: Tasmanian Aquaculture Industry (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.

Review of Tasmanian abalone dive rates (Knuckey & Sen 2017)

While this report isn't 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.

Social and Economic Evaluation of NSW Coastal Aquaculture (Barclay et al. 2016)

The report presents employment, expenditure, production and GVP data for Oyster and 'non-Oyster' businesses. While the production and GVP data may no longer be current, the expenditure and employment data are a usable starting point for modelling the cost structure of businesses in the industry as part of a national contributions study.

The value of inshore commercial fisheries to fishers and consumers in regional communities on Queensland's east coast (Pascoe et al. 2016)

The report presents gross regional product¹ estimates (direct and flow-on) for inshore fisheries in Queensland for 2013/14. While the production, GVP and, therefore, GRP data may no longer be current, the modelling approach used in the analysis to estimate flow-on effects (a form of short cut I-O analysis) is an interesting one and may prove to be a useful approach where alternative estimation methods are not possible.

¹ Referred to as gross value added in the report

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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.