



FINAL

# **An Impact Assessment of FRDC Investment in 2016-228: Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market**

**Agtrans Research**

**August 2018**

FRDC Project No **2016-134**

© Year Fisheries Research and Development Corporation.  
All rights reserved.

**An Impact Assessment of FRDC Investment in 2016-228: Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market  
Project 2016-134**

2018

**Ownership of Intellectual property rights**

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Fisheries Research and Development Corporation and Agtrans Research.

This publication (and any information sourced from it) should be attributed to **Hardaker, T., Chudleigh, P. & Abell, J., Agtrans Research, 2018, *An Impact Assessment of FRDC Investment in 2016-228: Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market*, November 2018. CC BY 3.0**

**Creative Commons licence**

All material in this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence, save for content supplied by third parties, logos and the Commonwealth Coat of Arms.



Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided you attribute the work. A summary of the licence terms is available from [creativecommons.org/licenses/by/3.0/au/deed.en](http://creativecommons.org/licenses/by/3.0/au/deed.en). The full licence terms are available from [creativecommons.org/licenses/by/3.0/au/legalcode](http://creativecommons.org/licenses/by/3.0/au/legalcode).

Inquiries regarding the licence and any use of this document should be sent to: [frdc@frdc.com.au](mailto:frdc@frdc.com.au)

**Disclaimer**

The authors do not warrant that the information in this document is free from errors or omissions. The authors do not accept any form of liability, be it contractual, tortious, or otherwise, for the contents of this document or for any consequences arising from its use or any reliance placed upon it. The information, opinions and advice contained in this document may not relate, or be relevant, to a readers particular circumstances. Opinions expressed by the authors are the individual opinions expressed by those persons and are not necessarily those of the publisher, research provider or the FRDC.

The Fisheries Research and Development Corporation plans, invests in and manages fisheries research and development throughout Australia. It is a statutory authority within the portfolio of the federal Minister for Agriculture, Fisheries and Forestry, jointly funded by the Australian Government and the fishing industry.

**Researcher Contact Details**

Name: Talia Hardaker  
Address: Suite 36, Benson House,  
Toowong QLD 4066  
Phone: 07 3870 4047  
Fax: 07 3371 3381  
Email: [talia@agtrans.com.au](mailto:talia@agtrans.com.au)

**FRDC Contact Details**

Address: 25 Geils Court  
Deakin ACT 2600  
Phone: 02 6285 0400  
Fax: 02 6285 0499  
Email: [frdc@frdc.com.au](mailto:frdc@frdc.com.au)  
Web: [www.frdc.com.au](http://www.frdc.com.au)

In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

# Contents

List of Tables .....	iv
List of Figures .....	iv
<b>Acknowledgments.....</b>	<b>v</b>
<b>Abbreviations.....</b>	<b>v</b>
<b>Executive Summary .....</b>	<b>vi</b>
<b>Introduction .....</b>	<b>7</b>
<b>General Method.....</b>	<b>8</b>
<b>Background and Rationale.....</b>	<b>9</b>
Background.....	9
Rationale .....	10
<b>Project Details.....</b>	<b>11</b>
Summary .....	11
Objectives .....	11
Logical Framework.....	11
<b>Project Investment .....</b>	<b>14</b>
Nominal Investment.....	14
Program Management Costs.....	14
Real Investment and Extension Costs.....	14
<b>Impacts .....</b>	<b>15</b>
<b>Valuation of Impacts .....</b>	<b>17</b>
Impacts Valued .....	17
Impacts Not Valued .....	17
<b>Results.....</b>	<b>18</b>
Investment Criteria.....	18
<b>Conclusions .....</b>	<b>19</b>
<b>Glossary of Economic Terms.....</b>	<b>20</b>
<b>References .....</b>	<b>21</b>

## List of Tables

Table 1: Logical Framework for Project 2016-228 .....	11
Table 2: Annual Investment in the Project 2016-228 (nominal \$) .....	14
Table 3: Triple Bottom Line Categories of Principal Impacts from Project 2016-228 .....	15
Table 4: Australian Government Research Priorities .....	16
Table 5: Reasons for Not Valuing Impacts .....	17
Table 6: Investment Criteria for Total Investment in Project 2016-228 .....	18
Table 7: Investment Criteria for FRDC Investment in Project 2016-228 .....	18

## List of Figures

Figure 1: Annual Cash Flow of Undiscounted Total Investment Costs .....	18
---	----

# Acknowledgments

Agtrans Research and Consulting would like to thank Patrick Hone (Executive Director) and Nicole Stubing (Project Manager) of the Fisheries Research and Development Corporation for facilitating contact with relevant project personnel and for their guidance and feedback throughout the Impact Assessment process.

## Abbreviations

ABARES	Australian Bureau of Agricultural and Resources Economics and Sciences
ABS	Australian Bureau of Statistics
ChAFTA	China-Australia Free Trade Agreement
CRRDC	Council of Rural Research and Development Corporations
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWR	Department of Agriculture and Water Resources (Commonwealth)
DFAT	Department of Foreign Affairs and Trade (Commonwealth)
FRDC	Fisheries Research and Development Corporation
NSW DPI	New South Wales Department of Primary Industries
OCS	Office of the Chief Scientist
PVC	Present Value of Investment Costs
RD&E	Research, Development and Extension
SRL	Southern Rock Lobster
VCA	Value Chain Analysis

# Executive Summary

## What the report is about

This report presents the results of an impact assessment of a Fisheries Research and Development Corporation (FRDC) investment in *Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market*. The project was funded by FRDC over the period December 2015 to March 2017.

## Methodology

The investment was analysed qualitatively within a logical framework that included activities and outputs, outcomes and impacts. Impacts were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation. Past and future cash flows were expressed in 2017/18 dollar terms and were discounted to the year 2017/18 using a discount rate of 5% to estimate the investment criteria.

## Results/key findings

None of the impacts/potential impact identified were valued. While the Phase 1 investment (project 2016-228), in conjunction with a Phase 2 investment (project 2016-177), is likely to contribute to several potential economic and social impacts in the future, the Phase 1 project alone did not produce any direct and/or significant impacts, so no quantitative evaluation processes were applied to estimate benefits.

## Investment Criteria

Total funding from all sources for the project was \$0.94 million (present value terms). FRDC investment in the project totalled \$0.17 million. However, none of the impacts identified were valued, hence a full set of investment criteria were not estimated or reported as part of the impact assessment.

## Conclusions

Though no impacts were valued, the Phase 1 project (2016-228) was successful and, in conjunction with the Phase 2 project (2016-177), is likely to have made some contribution to potential future increases in profitability and market access for the Australian Southern Rock Lobster industry.

## Keywords

**Impact assessment, cost-benefit analysis, Southern Rock Lobster, SRL, traceability, Sense-T, value chain analysis**

# Introduction

The Fisheries Research and Development Corporation (FRDC) required a series of impact assessments to be carried out annually on a number of investments in the FRDC research, development and extension (RD&E) portfolio. The assessments were required to meet the following FRDC evaluation reporting requirements:

- Reporting against the FRDC 2015-2020 RD&E Plan and the Evaluation Framework associated with FRDC's Statutory Funding Agreement with the Commonwealth Government.
- Annual Reporting to FRDC stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

The first series of impact assessments, that included 20 randomly selected FRDC investments, was completed in August of 2017. The published reports for the first series of evaluations can be found at: <http://frdc.com.au/Research/Benefits-of-research/2017-Portfolio-Assessment>

The second series of impact assessments also included 20 randomly selected FRDC investments. The investments were worth a total of approximately \$5.62 million (nominal FRDC investment) and were selected from an overall population of 96 FRDC investments worth an estimated \$21.32 million (nominal FRDC investment) where a final deliverable had been submitted in the 2016/17 financial year.

The 20 investments were selected through a stratified, random sampling process such that investments chosen spanned all five FRDC Programs (Environment, Industry, Communities, People and Adoption), represented approximately 26% of the total FRDC RD&E investment in the overall population (in nominal terms) and included a selection of small, medium and large FRDC investments.

Project 2016-228: *Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market* was selected as one of the 20 investments and was analysed in this report.

# General Method

The impact assessments followed general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some Universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2014).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses cost-benefit analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

# Background and Rationale

## Background

### Southern Rock Lobster

Southern Rock Lobster (SRL) (*Jasus edwardsii*) are found in the temperate Southern Ocean, with Australian populations found from NSW, around Tasmania and South Australia, to Western Australia. Adults can reach up to 23 cm in length and they range in colour from a reddish-purple and orange in shallower waters to purple and yellow in deeper waters. SRL are carnivorous, feeding on molluscs, small crustaceans, echinoderms (sea-urchins and sea-stars) and other benthic (bottom dwelling) organisms (NSW DPI, n.d.).

In 2015/16, SRL fisheries (found in South Australia, Victoria and Tasmania) landed approximately 4,000 tonnes of SRL with an estimated gross value of production of \$162.5 million (ABARES, 2017) with the South Australian fishery contributing around 50 per cent of the catch.

The SRL industry in Australia is represented by Southern Rocklobster Limited. Established in 2004, Southern Rocklobster Ltd serves as the national peak body working to further the interests of the Australian SRL industry (FRDC, 2017a).

### Australian Seafood Exports to China

In December 2015, Australia and China entered into the China-Australia Free Trade Agreement (ChAFTA). China is Australia's largest agriculture, forestry and fisheries export market worth approximately \$10.3 billion in 2015/16.

Since the ChAFTA came into effect, the value of Australia's direct seafood trade to China has increased by over four times, from an estimated \$85 million in 2015/16 to \$358 million in 2016/17 (DFAT, 2017). The agreement includes elimination of the 15 per cent tariff on rock lobster by 1 January 2019. In 2015/16 the value of Australian Rock Lobster exports to China was approximately \$8.4 million (ABARES, 2017).

However, an important feature of the Chinese seafood market is the 'grey trade'. This involves the transport of seafood into mainland China through informal channels in order to avoid tariffs. While the central government in China formally prohibits this trade, provincial and local authorities tolerate it. The prevalence of the grey trade for seafood imported into China means that traceability (defined as knowing the origin and supply chain of a product) is a significant challenge (Fabinyi, 2018).

## Rationale

A report by Southern Rocklobster Ltd (2013) focused on how Australia could strengthen the SRL supply chain into China under the Australia-China Agricultural Cooperation Agreement. The report recommended the implementation of a tagging/traceability system to clearly identify and differentiate Australian SRL in the Chinese market. Also, it was noted that a traceability system for SRL would facilitate compliance with the Global Seafood Sustainability Initiative<sup>1</sup>.

Four key challenges also were identified for the Australian SRL industry that impact on export growth. The challenges identified were:

- 1) The need to ensure ongoing market access.
- 2) The need to effectively and efficiently segregate lobster which may have been affected by Harmful Algal Blooms from non-affected lobster.
- 3) Reduce the costs of fish mortality claims from buyers.
- 4) Take steps, where possible, to ensure that fisheries management processes are efficient as well as effective.

Project 2016-288 was funded as 'Phase 1' of a two-phase RD&E investment with an objective to proactively develop a traceability system and related set of technologies that may help to solve the industry issues identified above. Phase 1 was a scoping study that combined the dual perspectives of agri-food value chain analysis and traceability systems analysis to design a traceability framework for Australian SRL and a set of initial recommendations. The project also suggested activities to be undertaken in the second, system design phase.

---

<sup>1</sup> For further information, see: <http://www.ourgssi.org/>

# Project Details

## Summary

Project Code: 2016-228
Title: <i>Phase 1: Traceability Systems for Wild Caught Lobster, Via Sense-T and Pathways to Market</i>
Research Organisation: University of Tasmania
Principal Investigator: Lawrence Bonney
Period of Funding: December 2015 to March 2017
FRDC Program Allocation: Industry (70%), Adoption (30%)

## Objectives

The project's key objectives were:

1. Supply chains mapped.
2. Traceability/sensor technologies integrated in chains.
3. Traceability system validated.

## Logical Framework

Project 2016-228 aimed to improve the traceability and product provenance within the wild-caught SRL supply chain. Table 1 provides a more detailed description of the project in a logical framework.

Table 1: Logical Framework for Project 2016-228

Activities and Outputs	<p><b>Value Chain Analysis (VCA)</b></p> <ul style="list-style-type: none"> <li>• A VCA was conducted for the Australian SRL industry.</li> <li>• The VCA included significant stakeholder engagement for the purpose of understanding existing material, information and relationship dynamics.</li> <li>• Participants in the VCA process included SRL fishers, processors and exporters, China-facing marketers, members of industry associations, state government representatives, researchers, technology suppliers, and regulators.</li> <li>• Detailed consultation with final customers and institutional stakeholders in the final market (China) was not possible within the scope of the project.</li> <li>• The VCA enabled the project team to develop a detailed understanding of Australian SRL industry operations and structure, including state-based variations.</li> <li>• The information obtained through the VCA was used to develop a preliminary VCA map for the Australian SRL industry that was useful for identifying key industry features and constraints.</li> <li>• Constraints on traceability in the Australian SRL industry included:             <ul style="list-style-type: none"> <li>○ Higher labour and material costs associated with the individual tagging of fish.</li> <li>○ Lack of physical space and infrastructure to enable segregation of fish.</li> <li>○ Market requirements for sorting by colour and size.</li> <li>○ Buyer resistance to increased traceability for transhipped fish.</li> <li>○ Continued Value Added Tax differentials.</li> <li>○ Variable technical capacity across both industry and government.</li> <li>○ Limited vertical integration and/or collaborative culture within industry.</li> </ul> </li> <li>• The VCA also resulted in identification of a range of value propositions or benefits that are likely to accrue to industry participants as a result of implementing increased traceability. Benefits identified included:</li> </ul>
------------------------	--

- Increased ability to meet requirements for direct shipments into China (and other markets).
- Increased ability to add value in the eyes of the Chinese final consumer.
- Increased vertical and horizontal collaboration among industry participants.
- Increased ability to safeguard against product misidentification or intentional substitution with species of lesser value.
- Increased ability to safeguard against fraudulent mortality claims by buyers.
- Increased ability to meet food safety and regulatory compliance, particularly with result to biotoxin levels.
- A more detailed VCA and SRL supply chain map will be developed in Phase 2 of the project.

#### **Traceability Analysis**

- An analysis was conducted on the SRL industry's preparedness for improved traceability systems and technologies.
- The traceability analysis included 23 interviews and site visits with SRL stakeholders around Australia. Participants included fishers, SRL processors, exporters, transporters and researchers.
- The analysis included a description of current traceability practices along the SRL supply chain and identified key differences in practices between states. Traceability practices were documented for SRL traceability practices on water, on land for transportation, and for processing and load-out.
- The analysis also investigated compliance and regulatory issues associated with traceability for the Australian SRL industry.
- Consultation was then conducted by telephone with commercial systems and technologies vendors. Over 48 vendors were contacted.
- A literature review also was undertaken as part of the traceability analysis. The review captured over 200 research papers on traceability, seafood eco-labelling, compliance and regulation, and the science of rock lobsters, as well as over 130 FRDC SRL industry project reports.
- The consultation process and literature review were used to develop a thorough understanding of currently available commercial systems and technologies for product traceability. Types of systems/technologies identified included demonstrated hardware, software, tags, labels and clips (including Radio-Frequency Identification and Passive Integrated Transponder tagging solutions), electronic scales and callipers and electronic grading systems.
- The traceability analysis generated three key findings. These findings were phrased as 'Goals' for development of future SRL traceability and included:
  - 1) Increasing the breadth, depth and precision of existing SRL traceability practices along the supply chain.
  - 2) Introducing a low cost, low impact traceability framework across different parts of Australia to accommodate scope and scale of different businesses.
  - 3) Supporting implementation of a phased set of technologies with 'best practices' guidelines for actors along the supply chain.
- After integrating the findings of the VCA and traceability analysis, the project produced a traceability framework and recommended three models of traceability be explored further within the SRL industry. The models were:
  - 1) Batch level,
  - 2) Batch level with individual tagging, and
  - 3) Item level with individual tagging.
- The project final report included a 'plan of action' to research and develop the three models in Phase 2 of the project.

Outcomes	<ul style="list-style-type: none"> <li>• Phase 2 of the project (FRDC project 2016-177) was approved and funded from September 2017 to July 2019.</li> <li>• The objectives of Phase 2 are as follows:             <ol style="list-style-type: none"> <li>1. Traceability/sensor technologies integrated in chains;</li> <li>2. Traceability system validated;</li> <li>3. Traceability system value proposition(s) determined.</li> </ol> </li> <li>• The primary focus of Phase 2 is on developing a ‘best practices’ guide for traceability systems in the SRL supply chain for products destined for China, underpinned with case-studies demonstrating the benefits of adopting systems and technologies for traceability.</li> <li>• Work on the ‘best practices’ guide is underway, and, to date, the project has completed the following activities/outputs:             <ul style="list-style-type: none"> <li>○ Development of six mobile apps to convert traceability paperwork into digital forms for processors (currently being trialled in Tasmania).</li> <li>○ Preparation of a trial/evaluation of low cost ‘real time’ water quality sensors for processors and boats to evaluate mortality and water quality.</li> <li>○ Preparation of trial/evaluation of fish tagging technologies with processors. The project also is trialling QR-codes with Tasmanian processors for domestic markets.</li> <li>○ Ongoing recruitment of processors in South Australia, Victoria and Tasmania to participate in trial/evaluations. Also, an expanded stakeholder engagement schedule was developed.</li> </ul> </li> <li>• The final output of the Phase 1 and 2 investments is likely to be a suite of enhanced traceability practices and technologies. Many SRL industry participants, including producers, processors and exports, are likely to adopt such practices and technologies to improve the value of SRL exports to China and to reduce risks (such as risks associated with buyer mortality claims and market access).</li> </ul>
Impacts	<ul style="list-style-type: none"> <li>• Some contribution to potentially increased profitability for Australian SRL producers through an increase in the price premium received for Australian SRL products exported to China as a result of enhanced traceability of Australian SRL products.</li> <li>• Some contribution to potentially improved/maintained market access for Australian SRL exporters through improved regulatory compliance and food safety because of enhanced traceability of Australian SRL products.</li> <li>• Some contribution to potentially increased profitability for Australian SRL exporters through the reduced risk of fraudulent buyer mortality claims because of improved traceability of Australian SRL products.</li> <li>• Some contribution to the potentially increased cost of production for Australian SRL producers/exporters because of adoption of enhanced traceability practices and technologies.</li> <li>• Some contribution to potentially improved regional community well-being from spill-over impacts associated with increased profitability for Australian SRL producers.</li> <li>• Increased industry knowledge and research capacity.</li> </ul>

# Project Investment

## Nominal Investment

Table 2 shows the annual investment (cash and in-kind) in project 2016-228 by FRDC and others. ‘Other’ investors included the University of Tasmania, CSIRO and Southern Rocklobster Ltd.

Table 2: Annual Investment in the Project 2016-228 (nominal \$)

<b>Year ended 30 June</b>	<b>FRDC (\$)</b>	<b>OTHER (\$)</b>	<b>TOTAL (\$)</b>
2016	80,000	520,007	600,007
2017	55,000	164,473	219,473
<b>Totals</b>	<b>135,000</b>	<b>684,480</b>	<b>819,480</b>

## Program Management Costs

For the FRDC investment the cost of managing the FRDC funding was added to the FRDC contribution for the project via a management cost multiplier (1.122). This multiplier was estimated based on the share of ‘employee benefits’ and ‘supplier’ expenses’ in total FRDC expenditure (5-year average) reported in the FRDC’s Cash Flow Statement (FRDC, Annual Reports, 2013-2017b). This multiplier then was applied to the nominal investment by FRDC shown in Table 2.

For the investment by other partners, it was assumed that program management and administration costs were already included in the nominal amounts shown in Table 2.

## Real Investment and Extension Costs

For the purposes of the investment analysis, the investment costs of all parties were expressed in 2017/18 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2018). No additional costs of extension were included as the project included a high level of consultation with key stakeholders, including Government and SRL supply chain participants, and extension through presentations and published project findings as well as through trials conducted as part of Phase 2 of the investment.

# Impacts

Table 3 provides a summary of the principal types of impacts from the Phase 1 SRL traceability investment. Impacts have been categorised into economic, environmental and social impacts.

Table 3: Triple Bottom Line Categories of Principal Impacts from Project 2016-228

Economic	<ul style="list-style-type: none"> <li>• Some contribution to potentially increased profitability for Australian SRL supply chain participants through an increase in the price premium received for Australian SRL products exported to China as a result of enhanced traceability of Australian SRL products.</li> <li>• Some contribution to potentially improved/maintained market access for Australian SRL exporters through improved regulatory compliance and food safety because of enhanced traceability of Australian SRL products.</li> <li>• Some contribution to potentially increased profitability for Australian SRL exporters through the reduced risk of fraudulent buyer mortality claims because of improved traceability of Australian SRL products.</li> <li>• Some contribution to the potentially increased cost of production for Australian SRL producers/exporters because of adoption of enhanced traceability practices and technologies.</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Nil</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Some contribution to potentially improved regional community well-being from spill-over impacts associated with increased profitability for Australian SRL supply chain participants.</li> <li>• Increased industry knowledge and research capacity.</li> </ul>

## Public versus Private Impacts

Both public and private impacts were identified for the project. Private impacts include some potential contribution to increased profitability and improved market access for Australian SRL producers and exports as well as potential contribution to increased production costs. Minor public impacts may be delivered through social impacts in the form of increased research capacity and regional community spill-overs.

## Distribution of Private Impacts

Private impacts will primarily be captured by individual Australian SRL producer/exporter businesses. There also may be some positive impacts to operators along the SRL supply chain, including input suppliers and processors. Impacts will be distributed according to associated supply and demand elasticities.

## Impacts on other Australian industries

No significant impacts to other Australian industries are expected. However, some learnings from the SRL traceability investment may be applicable to other fishery/aquaculture industries in the future.

## Impacts Overseas

No significant impacts to overseas parties are expected.

**Match with National Priorities**

The Australian Government’s Science and Research Priorities and Rural RD&E priorities are reproduced in Table 4. The project findings and related impacts will contribute primarily to Rural RD&E Priorities 1 and 4, and to Science and Research Priority 1.

Table 4: Australian Government Research Priorities

<b>Australian Government</b>	
<b>Rural RD&amp;E Priorities (est. 2015)</b>	<b>Science and Research Priorities (est. 2015)</b>
<ol style="list-style-type: none"> <li>1. Advanced technology</li> <li>2. Biosecurity</li> <li>3. Soil, water and managing natural resources</li> <li>4. Adoption of R&amp;D</li> </ol>	<ol style="list-style-type: none"> <li>1. Food</li> <li>2. Soil and Water</li> <li>3. Transport</li> <li>4. Cybersecurity</li> <li>5. Energy and Resources</li> <li>6. Manufacturing</li> <li>7. Environmental Change</li> <li>8. Health</li> </ol>

Sources: (DAWR, 2015) and (OCS, 2015)

# Valuation of Impacts

## Impacts Valued

While the Phase 1 investment (project 2016-228), in conjunction with the Phase 2 investment (project 2016-177), is likely to contribute to several potential economic and social impacts in the future, the Phase 1 project alone did not produce any direct and/or significant impacts, so no quantitative evaluation processes were applied to estimate benefits.

## Impacts Not Valued

The impacts identified in Table 4 were not valued for the following reasons (Table 5):

Table 5: Reasons for Not Valuing Impacts

<b>Impact/Potential Impact</b>	<b>Reason(s) why Impact Not Valued</b>
Some contribution to potentially increased profitability for Australian SRL producers through an increase in the price premium received for Australian SRL products exported to China as a result of enhanced traceability of Australian SRL products.	Significant uncertainty about the potential pathways to impacts and a lack of evidence/data on which to base credible assumptions.  Also, a lack of responses/feedback from key personnel associated with the project.
Some contribution to potentially improved/maintained market access for Australian SRL exporters through improved regulatory compliance and food safety because of enhanced traceability of Australian SRL products.	
Some contribution to potentially increased profitability for Australian SRL exporters through the reduced risk of fraudulent buyer mortality claims because of improved traceability of Australian SRL products.	
Some contribution to the potentially increased cost of production for Australian SRL producers/exporters because of adoption of enhanced traceability practices and technologies.	
Increased industry knowledge and research capacity.	Significant uncertainty around the magnitude of any increases to capacity, and a lack of evidence/data available to make reasonable assumptions about incremental capacity change and values.
Some contribution to potentially improved regional community well-being from spill-over impacts associated with increased profitability for Australian SRL producers.	Significant uncertainty around the magnitude of any changes to community well-being, and a lack of evidence/data available to make reliable assumptions about incremental well-being change and values.

# Results

All past costs were expressed in 2017/18 dollar. All costs were discounted to 2017/18 using a discount rate of 5%.

## Investment Criteria

Tables 6 and 7 show the investment criteria estimated for different periods of benefits for the total investment and the FRDC investment respectively. Note that, as no impacts were valued, the investment criteria reporting was limited to the Present Value of Investment Costs (PVC).

In the interests of consistency with other FRDC project analyses and reporting, the PVC was reported for the length of the investment and for different time periods up to 30 years from the last year of investment (2016/17) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2014). The FRDC proportion of real investment (undiscounted) was estimated to be 18.0%.

Table 6: Investment Criteria for Total Investment in Project 2016-228

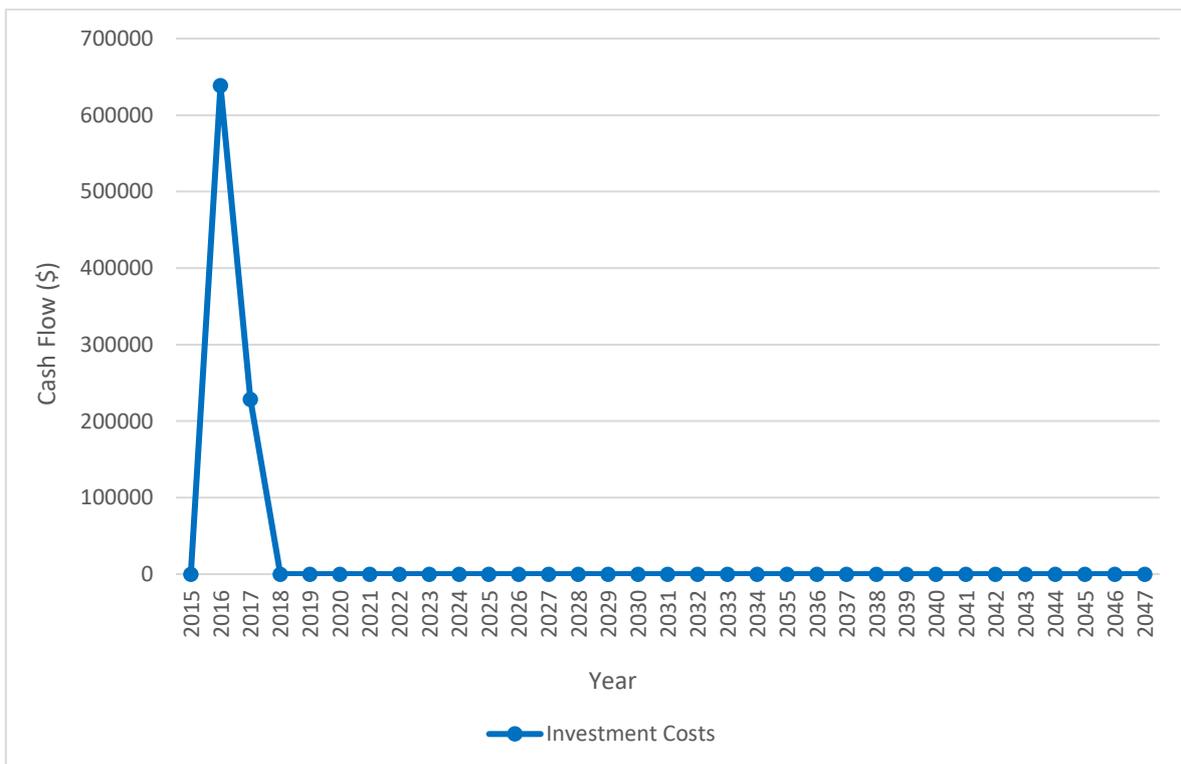
Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Costs (\$m)	0.94	0.94	0.94	0.94	0.94	0.94	0.94

Table 7: Investment Criteria for FRDC Investment in Project 2016-228

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Costs (\$m)	0.17	0.17	0.17	0.17	0.17	0.17	0.17

The annual undiscounted cost cash flow for the total investment for the duration of the project 2016-228 investment plus 30 years from the last year of investment is shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Investment Costs



# Conclusions

Funding for project 2016-228 totalled \$0.94 million (present value terms). The FRDC investment costs were \$0.17 million (present value terms). While several impacts/potential impacts were identified, the project did not result in any direct and/or significant impacts that could be valued. However, the Phase 1 project (2016-228) was successful and, in conjunction with the Phase 2 project (2016-177), is likely to have made some contribution to potential future increases in profitability and market access for the Australian SRL industry.

# Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of investment costs:	The discounted value of investment costs.

# References

- Australian Bureau of Agricultural and Resource Economics and Sciences. (2017). Australian Fisheries and Aquaculture Statistics. Canberra: Australian Bureau of Agricultural and Resource Economics and Sciences. Retrieved from [http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2016/AustFishAquacStats\\_2016\\_v1.0.0.pdf](http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2016/AustFishAquacStats_2016_v1.0.0.pdf)
- Australian Bureau of Statistics. (2018, January 31). 5204.0 - Australian System of National Accounts, 2016-17. Retrieved from Australian Bureau of Statistics: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5204.02016-17?OpenDocument>
- Council of Rural Research and Development Corporations. (2014). Impact Assessment Guidelines. Canberra: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/wp-content/uploads/2016/04/CRRDC-Impact-Assessment-Guidelines-V.1-070514.pdf>
- Department of Foreign Affairs and Trade. (2017, September). ChAFTA and agriculture & processed food. Retrieved from Australian Government - Department of Foreign Affairs and Trade: China-Australia Free Trade Agreement: <https://dfat.gov.au/trade/agreements/in-force/chafta/fact-sheets/Pages/chafta-fact-sheet-agriculture-and-processed-food.aspx>
- Department of Agriculture and Water Resources. (2015). Agricultural Competitiveness White Paper. Canberra: Commonwealth of Australia. Retrieved from <http://agwhitepaper.agriculture.gov.au/SiteCollectionDocuments/ag-competitiveness-white-paper.pdf>
- Fabinyi, M. (2018). The Chinese seafood market: opportunities and challenges for Australian exporters. Sydney: The Australia-China Relations Institute, University of Technology Sydney. Retrieved from <http://www.australiachinarelations.org/sites/default/files/20180628%20Australia-China%20Relations%20Institute%20report%20-%20The%20Chinese%20seafood%20market%20-%20opportunities%20and%20challenges%20for%20Australian%20exporters%20-%20Michael%20Fabinyi.pdf>
- Fisheries Research and Development Corporation. (2017a). Southern Rock Lobster Limited. Retrieved from Fisheries Research and Development Corporation - Partners: <http://www.frdc.com.au/Partners/Industry-Partnership-Agreements/SRL>
- Fisheries Research and Development Corporation. (2013 to 2017b). Annual Report. Canberra: Fisheries Research and Development Corporation.
- NSW Department of Primary Industries. (n.d.). Southern Rock Lobster. Retrieved from NSW Department of Primary Industries: <https://www.dpi.nsw.gov.au/fishing/fish-species/species-list/southern-rock-lobster>
- Office of the Chief Scientist. (2015). Strategic Science and Research Priorities. Canberra: Commonwealth of Australia. Retrieved from [http://www.chiefscientist.gov.au/wp-content/uploads/STRATEGIC-SCIENCE-AND-RESEARCH-PRIORITIES\\_181214web.pdf](http://www.chiefscientist.gov.au/wp-content/uploads/STRATEGIC-SCIENCE-AND-RESEARCH-PRIORITIES_181214web.pdf)
- Southern Rocklobster Limited. (2013). Australia China Agricultural Cooperation Agreement - April 2013 Delegation - Project Report - Strengthening the Southern Rock Lobster Supply Chain into China. Melbourne: Southern Rocklobster Ltd. Retrieved from [http://www.tasrocklobster.com/upfiles/trlfa/cont/industry\\_info/aust\\_\\_china\\_agri\\_\\_cooperation\\_agreement\\_\\_april\\_2013\\_delegation\\_report.pdf](http://www.tasrocklobster.com/upfiles/trlfa/cont/industry_info/aust__china_agri__cooperation_agreement__april_2013_delegation_report.pdf)