FINAL REPORT

An Impact Assessment of Investment in FRDC Project 2018-205:

Informing Strategies, Policies, and Options Supporting Owner-Operated Fishing Businesses in Fisheries Experiencing Corporatisation

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Abbreviations

CBA	Cost-Benefit Analysis
CRRDC	Council of Rural Research and Development Corporations
FRDC	Fisheries Research and Development Corporation
IRR	Internal Rate of Return
ITQ	Individual Transferable Quota
MIRR	Modified Internal Rate of Return
NSW	New South Wales
RD&E	Research, Development and Extension
SFU	Simon Fraser University, Canada
SRL	Southern Rocklobster Limited

Executive Summary

This report presents an impact assessment of investment in Fisheries Research and Development Corporation (FRDC) Project 2018-205: *Informing strategies, policies, and options supporting owner-operated fishing businesses in fisheries experiencing corporatisation*. The assessment was completed as part of a cost benefit analysis for inclusion in the FRDC 2022-23 Annual Report. The assessment was made up of six FRDC RD&E projects.

The impact assessment 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 assessment components that are in accord with the impact assessment guidelines of the Council of Rural Research and Development Corporations.

Project 2018-205 research has delivered knowledge to the southern rock lobster (SRL) industry on fisheries management that will help inform future policy making. More informed stakeholders are likely to make better decisions and avoid outcomes that erode the value of the fishery. In 2021/22 the SRL fishery was valued at $200 million per annum. Project 2018-205 has contributed to:

- Avoided loss of southern rock lobster economic value as a result of poor policy decisions.
- Better educated industry stakeholders with additional decision-making capacity.
- Avoided adverse environmental impacts associated with adoption of poor policy options.

Total funding for the Project was $0.03 million (present value terms) and produced total expected net benefits of $0.09 million (present value terms). This produced an estimated net present value of $0.05 million, a benefit-cost ratio of 2.6 to 1, an internal rate of return (IRR) of 302.8%, and a modified IRR of 13.8% (over 30 years, using a 5% discount rate and 5% finance rate).

Given the conservative assumptions made and the fact that two impacts were not valued in monetary terms, the investment criteria reported are likely to be an underestimate of the true performance of the investment in Project 2018-205. The positive results should be viewed favourable by FRDC, the Australian Government, industry, and other RD&E stakeholders.

Keywords

2018-205, Fishery Corporatisation, Owner-operated fisheries, Strategy, Policy, Options, Evaluation, Impact Assessment, Cost-Benefit Analysis

Introduction

The Fisheries Research and Development Corporation (FRDC) required a series of cost benefit analyses of selected RD&E investments (projects) for inclusion in the FRDC 2022/23 Annual Report. The assessments were completed to contribute to the following FRDC evaluation reporting requirements:

- Reporting against the FRDC 2020-2025 RD&E Plan and the Evaluation Framework associated with FRDC's Statutory Funding Agreement with the Commonwealth Government.
- Annual Reporting to FRDC funding partners and other stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).
- Reporting RD&E impact and performance to FRDC levy payers and other fisheries and aquaculture stakeholders as well as the broader Australian community.

In August 2023, FRDC commissioned ACRE Economics Pty Ltd and associates to undertake cost benefit analyses (CBAs) of six RD&E projects funded under the FRDC 2020-2025 RD&E Plan and completed in the years ended 30 June 2017 to 2021. The projects were selected by FRDC and spanned the organisation's current RD&E Programs and Strategic Outcomes. The sample selected (six projects) comprises a relatively small proportion of the FRDC's total RD&E investment (~5%) of the relevant population and may, therefore, not be fully representative of the entire RD&E Portfolio. However, the projects evaluated provide insight into the activities and outputs associated with each of FRDC's RD&E Programs, and the outcomes and impacts (and benefits) created. In turn, this will enable communication of benefits of FRDC RD&E to the FRDC Board, funding partners including the Commonwealth, industry, and other stakeholders.

The six projects selected by FRDC for evaluation in calendar 2023 were:

1. 2016-224: *Boosting fisher returns through smart value adding and greater use of underutilised species*
2. 2016-261: *Investigating the use of trace element profiles to substantiate provenance for the Australian prawn industry*
3. 2017-242: *Our Pledge: Australian seafood industry response to community values and expectations*
4. 2018-148: *A Stock Assessment Toolbox for Australian Fisheries*
5. 2018-164: *Commercial production trial with high POMS tolerant triploid Pacific Oysters in approved NSW estuaries*
6. 2018-205: *Informing strategies, policies and options supporting owner-operated fishing businesses in fisheries experiencing corporatisation*

This report presents the assessment process and findings for Project 2018-205: *Informing strategies, policies and options supporting owner-operated fishing businesses in fisheries experiencing corporatisation.*

Evaluation Framework

The annual impact assessments of FRDC RD&E investments 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 assessment components that are in accord with the current guidelines for impact assessment published by the CRRDC (CRRDC, 2018).

The evaluation process utilised an input to impact continuum RD&E project inputs (costs), objectives, activities, and outputs were briefly described and documented. Actual and expected outcomes, and any actual and/or potential future impacts (positive and/or negative) associated with project outcomes then were identified and described. The principal economic, environmental, and social impacts were then summarised in a triple bottom line framework and validated through consultation with expert personnel and review of published literature.

Once impacts were identified and validated, an assessment then was made about whether to quantify/value any of the impacts in monetary terms as part of the project-level analysis. The decision to value an impact identified was based on:

- Data availability and information necessary to form credible valuation assumptions,
- The complexity of the relevant valuation methods applicable given project resources,
- The likely magnitude of the impact and/or the expected relative value of the impact compared to other impacts identified, and
- The strength of the linkages between the RD&E investment and the impact identified.

Where one or more of the identified impacts were selected for valuation, the impact assessment used cost-benefit analysis (CBA) as a principal tool. The impacts valued therefore were deemed to represent the principal benefits delivered by the project investment. However, as not all impacts were valued (based on the selection criteria), the investment criteria estimated for the project investment evaluated are likely to represent an underestimate of the true performance of the FRDC project.

The qualitative and quantitative analysis processes, data sources, assumptions, specific valuation frameworks (where applicable), and evaluation results were clearly documented and then integrated into a written report.

Project Background

Background

The Australian wild-caught southern rock lobster industry operates in the south eastern part of Australia and spans three jurisdictional areas – South Australia, Victoria, and Tasmania. The industry comprises a fleet of vessels run by a mix of family owned and operated businesses and vertically integrated export businesses.

Some industry participants consider that the ownership structure of the fishery has an impact on the culture of the industry, which extends to benefits to regional communities, employment, and job satisfaction.

Rationale for Project 2018-205

Southern Rocklobster Limited (SRL), the national peak body representing the interests of the Australian southern rock lobster industry, recognised that there is a diversity in the composition of the industry's structure and the receipt of benefits from the fishery varies between user types. With this in mind, SRL secured FRDC project funding to investigate strategies, policies, and options to support owner operated fishing businesses. FRDC Project 2018-205 was delivered as a workshop to identify examples of other fisheries successfully negotiating corporatisation along with management options that might be applicable to the southern rock lobster industry.

Project Details

Summary

Project Code: 2018-205

Title: *Informing strategies, policies, and options supporting owner-operated fishing businesses in fisheries experiencing corporatisation*

Research Organisation: Southern Rocklobster Ltd

Principal Investigator: Thomas Cosentino

Period of Funding: June 2019 to December 2019

FRDC Program Allocation: Communities 100%

Objectives

The specific objectives of project 2018-205 were to:

1. Plan for and adapt to corporatisation in the southern rock lobster fishery and summarise concerns and identify possible solutions.
2. Identify ways that fishers can become better organised and better able to protect their interests.
3. Identify comparisons with fisheries that exist within Individual Transferable Quota (ITQ) managed systems.

Logical Framework

Table 1: Logical Framework for FRDC Project 2018-205

Activities	• Delivery of a strategy, policy, and option development workshop in Melbourne 7 October 2019. The workshop was attended by southern rock lobster industry leaders and fisheries management. The workshop was facilitated by Professor Caleb Gardner, Institute for Marine and Arctic Studies, University of Tasmania. • Keynote speakers included Dr Nick Rayns independent fisheries consultant and former second in command Australian Fisheries Management Authority, Dr Evelyn Pinkerton a marine anthropologist and professor of Resource and Environmental Management SFU Canada, Dr Joshua Stoll, a researcher in ocean governance and the resilience of coastal communities, Stephen Xiao KPMG, and Mike Barron a lobster fisher from Nova Scotia. • The objective of the workshop was to identify management options to address consolidation of ownership in the southern rock lobster industry. • The workshop agenda included: 1) The economic fundamentals of ITQ management, 2) How does the community benefit from ITQs, 3) Where are we headed with current targets for southern rock lobster fisheries, 4) Who is responsible for retrieving the bolted horse (i.e., reduced employment and a contraction in regional benefit from the fishery)? 5) Could we put the horse back in the stable even if we wanted to? • Keynote speakers presented information of ITQs, their history in Australia and case studies from North America. • Dr Rayns provided information on the benefits that Total Allowable Catch ITQs offer fishers. These included integration with macro changes in global economies and followed trends in capitalism and the enhancement of free trade. • The workshop discussed the various aspects of the characterisation of 'rights' including flexibility, exclusivity, quality of title, transferability, divisibility, and duration.

	• The workshop considered whether individual transferable quotas constitute rights. In Australia there has been a push to equate ITQs as rights which increase exclusivity and reduce investor's exposure to the risk of a change in government policy. • There are alternative business arrangements that have not been considered in Australian fisheries management and speakers outlined options for curbing the rate at which a fishery becomes more exclusive. • For alternative business arrangements to work, stakeholders in a fishery must first decide on their goals. Goals might include the prevalence of owner operator businesses, low entry costs for young fishers, support for regional communities, and return on investment. • The workshop identified but did not assess options to deliver fishery management goals. These options ranged from legislative and regulatory instruments to voluntary local agreements.
Outputs	The workshop did not target realisable solutions for industry. Instead, it delivered: • A succinct summary and discussion on current direction of the SRL fishery, and options for changing course gleaned from overseas fisheries. • A synthesis of alternative business/deed/corporate models that can be used to deliver different objectives. These included ITQs, Total Allowable Catch, Individually Transferable Effort, or Input Controls. For each option the synthesis addressed 1) a succinct overview, 2) a conceptual framework for informing decisions, 3) case studies, and 4) further resource material. • Increased knowledge and debate/discussion opportunities for attendees at the workshop. • Draft and final workshop reports.
Outcomes	• Better informed decision-making that will protect the value of the southern rock lobster fishery. • Knowledge to inform further R&D projects including FRDC Project 2020-029 Improving performance of ITQ fisheries.
Impacts (potential)	• Avoided loss of southern rock lobster economic value as a result of poor policy decisions. • Better educated industry stakeholders with additional decision-making capacity. • Avoided adverse environmental impacts associated with adoption of poor policy options.

Source: FRDC project documentation

Nominal Investment

Table 2 shows the total annual investment made in project 2018-205 by FRDC. There were no other contributors.

Table 2: Total Investment in FRDC Project 2018-205
(nominal dollar terms)

Year ended 30 June	FRDC ($)	Others ($)	Total ($)
2019	18,000	0	18,000
2020	2,000	0	2,000
Totals	**20,000**	**0**	**20,000**

Source: FRDC project 2018-205 documentation

Management and Administration 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 (x1.179). This multiplier was estimated based on a five-year average of the ratio of total FRDC cash expenditure to project expenditure reported in the FRDC's Cash Flow Statement (FRDC Annual Reports, 2018-2022). This multiplier then was applied to the nominal investment by FRDC shown in Table 2. A multiplier of 1.00 was used for administration and management costs for other contributors.

Real Investment and Extension Costs

For the purposes of the impact analysis, the investment costs of all parties were expressed in 2022/23-dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2023).

There were no additional extension costs associated with this project.

Impacts

Table 3 provides a summary of the principal types of potential impacts from project 2018-205. Impacts have been taken from those listed in Table 1 and categorised using a triple bottom line framework into economic, environmental, and social impact types.

Table 3: Principal Potential Impact Types from Investment in FRDC Project 2018-205

Economic	• Avoided loss of southern rock lobster economic value as a result of poor policy decisions.
Environmental	• Avoided adverse environmental impacts associated with adoption of poor policy options.
Social	• Better educated industry stakeholders with additional decision-making capacity.

Public versus Private Impacts

Both public and private potential impacts were identified for the project. Private impacts may be delivered via avoiding loss of southern rock lobster economic value as a result of poor policy decisions. Public impacts are likely to be delivered through avoided adverse environmental impacts associated with adoption of poor policy decisions and better educated industry stakeholders with additional decision-making capacity.

Distribution of Private Impacts

Private impacts from the investment in project 2018-205 will accrue to southern rock lobster fishers and their supply chains. Supply chain beneficiaries will include wholesalers, exporters, retailers, and consumers. The share of benefit retained by each member of the supply chain will depend on both short- and long-term supply and demand elasticities.

Impacts on Other Australian Industries

The principles communicated to southern rock lobster stakeholders regarding the merits of ITQ and its alternatives will be applicable to other Australian fishing industries managed on the same basis.

Impacts Overseas

An appropriately managed southern rock lobster fishery will ensure a sustainable supply of quality Australian lobster to export markets.

Match with National Priorities

Australian Agriculture, Science, and Research Priorities

The Australian Government's National Science and Research Priorities and Agricultural Innovation Priorities are reproduced in Table 4. Project 2018-205 contributed to National Science and Research Priorities 1 and 2. The project also contributed to Agricultural Innovation Priority 1.

Table 4: Australian R&D Priorities

Australian Government	
National Science and Research Priorities[1]	**National Agricultural Innovation Priorities**[2]
1. Food – optimising food and fibre production and processing; agricultural productivity and supply chains within Australia and global markets. **2. Soil and Water** – improving the use of soils and water resources, both terrestrial and marine. **3. Transport** – boosting Australian transportation: securing capability and capacity to move essential commodities; alternative fuels; lowering emissions. **4. Cybersecurity** – improving cybersecurity for individuals, businesses, government, and national infrastructure. **5. Energy and Resources** – supporting the development of reliable, low cost, sustainable energy supplies and enhancing the long-term viability of Australia's resources industries. **6. Manufacturing** – supporting the development of high value and innovative manufacturing industries in Australia. **7. Environmental Change** – mitigating, managing, or adapting to changes in the environment. **8. Health** – improving the health outcomes for all Australians.	On 11 October 2021, the National Agricultural Innovation Policy Statement was released. It highlights four long-term priorities for Australia's agricultural innovation system to address by 2030. These priorities replace the Australian Government's Rural Research, Development and Extension Priorities which were published in the 2015 Agricultural Competitiveness White Paper. **1.** Australia is a trusted exporter of premium food and agricultural products by 2030. **2.** Australia will champion climate resilience to increase the productivity, profitability, and sustainability of the agricultural sector by 2030. **3.** Australia is a world leader in preventing and rapidly responding to significant incursions of pests and diseases through futureproofing our biosecurity system by 2030. **4.** Australia is a mature adopter, developer, and exporter of digital agriculture by 2030.

FRDC National RD&E Priorities

Through extensive consultation, the FRDC 2020-2025 RD&E Plan identified five key outcome areas. The five outcome areas were:

1. Growth for enduring prosperity.
2. Best practices and production systems.
3. A culture that is inclusive and forward thinking.
4. Fair and secure access to aquatic resources.
5. Community trust, respect, and value.

Project 2018-205 addressed outcome area 2, 3 and 4.

[1] Source: 2015 Australian Government *Science and Research Priorities*. https://www.industry.gov.au/data-and-publications/science-and-research-priorities.

[2] Source: 2021 National Agriculture Innovation Policy Statement. https://www.awe.gov.au/agriculture-land/farm-food-drought/innovation/research_and_development_corporations_and_companies#government-priorities-for-investment.

Valuation of Impacts

The decision to value an impact identified in Table 3 was based on:

- Data availability and information necessary to form credible valuation assumptions,
- The complexity of the relevant valuation methods applicable given project resources,
- The likely magnitude of the impact and/or the expected relative value of the impact compared to other impacts identified, and
- The strength of the linkages between the RD&E investment and the impact identified.

Impacts Valued

A single potential impact of investment in project 2018-205 was valued – avoided loss of industry value due to poor policy decisions.

Valuation of Impact 1: Avoided loss of industry value due to poor policy decisions

Project research has delivered knowledge to the SRL industry on fisheries management that will help inform future policy making. More informed stakeholders are likely to make better decisions and avoid outcomes that erode the value of the fishery. In 2021/22 the SRL fishery was valued at $200 million per annum.

Assumptions made for the valuation of this impact are reported in Table 5.

Impacts Not Valued

The impacts not valued included:

- Better educated industry stakeholders with additional decision-making capacity. Additional insight on the types of issues beyond SRL fishery management is needed to quantify this impact.
- Avoided adverse environmental impacts associated with adoption of poor policy options. Additional insight on the type and timing of environmental damage is needed to quantify this impact.

Summary of Assumptions

Table 5 describes the specific assumptions used in the valuation of impacts.

Table 5: Summary of Assumptions for the Valuation of Impact 1

Impact 1: Avoided loss of industry value due to poor policy decisions		
Variable	**Assumption**	**Source**
Beach value of southern rock lobster.	$200 million.	Southern Rock Lobster Strategy 2022.
Impact of poor policy on SRL beach value.	10% annual loss in value.	Analyst assumption.
Risk of poor policy pre-project 2018-205.	5%.	
Reduction in risk of poor policy after-project 2018-205.	5%.	
First year of project Toolbox use.	2020/21.	Analyst assumption – outcomes of project informing decision-making in the first year after workshop completion.
Period of impact – that is the number of years findings from the project workshop inform decision-making.	6 years (2025/26 is last year of impact).	Analyst assumption – alternative information informs decision making after this time e.g., findings from FRDC Project 2020- 029 Improving performance of ITQ fisheries.
Attribution of impact to this project.	100%.	Analyst assumption – the project was the start of research to inform ITQ review and refinement.
Risk Factors		
Probability of output	100%	Workshop has been held and relevant stakeholders were in attendance.
Probability of outcome	60%	There is some risk that workshop messages will not translate into informed policy decisions.
Probability of impact	60%	Other exogenous factors determine SRL value e.g., demand for Australian lobsters.
Counterfactual		
It is assumed that the benefits estimated and attributable to the investment in FRDC Project 2018-205 would not have occurred without the investment.		

Results

All past costs and benefits were expressed in 2022/23-dollar terms. All costs and benefits were discounted to 2022/23 using a discount rate of 5%. A reinvestment rate of 5% was used for estimating the modified internal rate of return (MIRR). The base analysis used the best available estimates for each variable, notwithstanding a level of uncertainty for many of the estimates. All analyses ran for the length of the investment period plus 30 years from the last year of investment (2019/20) to the final year of benefits assumed.

Investment Criteria

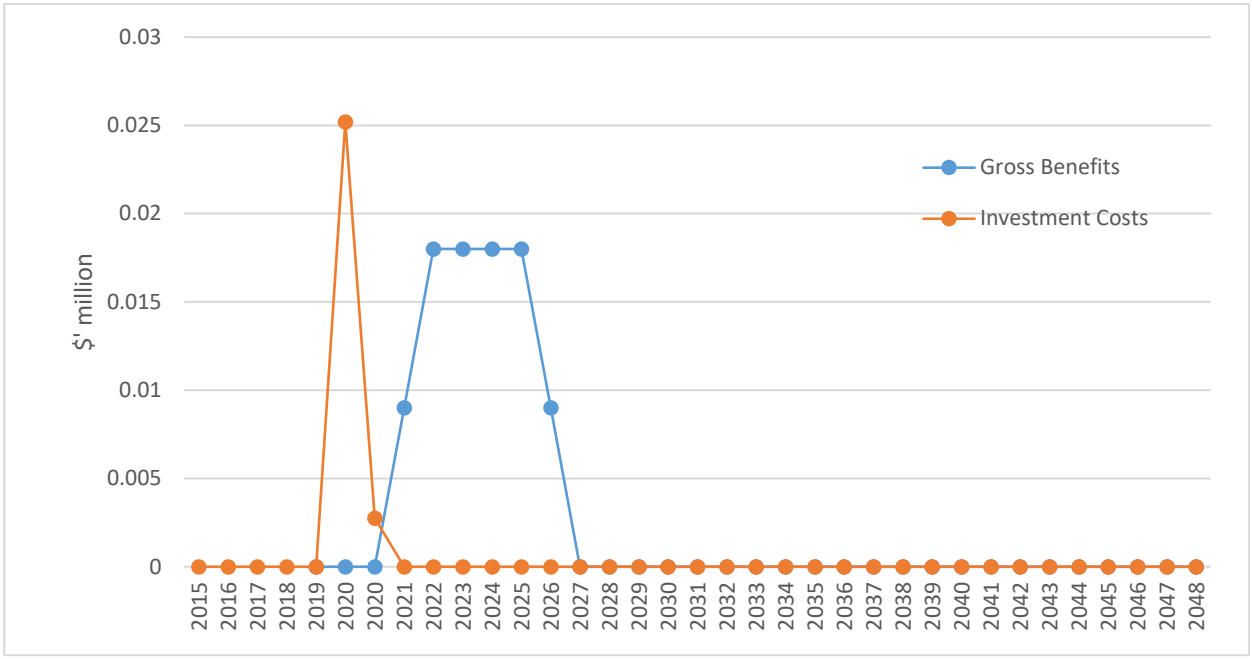
Table 6 shows the investment criteria estimated for different periods of benefits for the total investment. FRDC was the only investor in the project.

Table 6: Investment Criteria for Total Investment in Project 2018-205

Investment criteria	Number of years from year of last investment						
	0	5	10	15	20	25	30
Present value of benefits ($m)	0.00	0.08	0.09	0.09	0.09	0.09	0.09
Present value of costs ($m)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Net present value ($m)	-0.03	0.05	0.05	0.05	0.05	0.05	0.05
Benefit-cost ratio	0.00	2.37	2.60	2.60	2.60	2.60	2.60
Internal rate of return (%)	negative	301.0	302.8	302.8	302.8	302.8	302.8
MIRR (%)	negative	112.8	39.3	24.9	19.0	15.8	13.8

The annual undiscounted benefit and cost cash flows for the total investment for the duration of investment period plus 30 years from the last year of investment are shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Benefits and Total Costs



Sensitivity Analyses

Sensitivity analyses were performed for variables that were considered (a) key drivers of the investment criteria, and/or (b) uncertain. Each sensitivity analysis was performed for the total investment and with benefits taken over the life of the investment plus 30 years from the last year of investment. All other parameters were held at their base values.

A sensitivity analysis was carried out on the discount rate. The results, shown in Table 7, showed limited sensitivity to the discount rate. At the 10% discount rate project costs continue to exceed project benefits and show a favourable return on investment.

Table 7: Sensitivity to Discount Rate
(Total investment, 30 years)

Investment Criteria	**Discount rate**		
	0%	**5% (base)**	**10%**
Present value of benefits ($m)	0.09	0.09	0.09
Present value of costs ($m)	0.03	0.03	0.04
Net present value ($m)	0.06	0.05	0.05
Benefit-cost ratio	3.22	2.60	2.14

A sensitivity analysis then was carried out on the assumed reduction in southern rock lobster fishery value due to poor policy decisions. Project benefits continue to exceed project costs if the reduction in fishery value from poor policy decisions is only 5% - Table 8.

Table 8: Sensitivity to the Impact of Poor Policy on SRL Fishery Value
(Total investment, 5% discount rate, 30 years)

Investment Criteria	**Reduction in Fishery Value Due to Poor Policy**		
	5%	**10% (base)**	**15%**
Present value of benefits ($m)	0.04	0.09	0.13
Present value of costs ($m)	0.03	0.03	0.03
Net present value ($m)	0.01	0.05	0.10
Benefit-cost ratio	1.30	2.60	3.91

A final sensitivity analysis was undertaken on the reduction in poor policy risk attributable to the project. The results, presented in Table 9, show that project benefits continue to exceed project costs if the reduction in risk is only 2%.

Table 9: Sensitivity to Reduction in Poor Policy Risk Attributable to Project
(Total investment, 5% discount rate, 30 years)

Investment Criteria	**Reduction in Poor Policy Risk Attributable to Project**		
	2%	**5% (base)**	**7.5%**
Present value of benefits ($m)	0.04	0.09	0.13
Present value of costs ($m)	0.03	0.03	0.03
Net present value ($m)	0.00	0.05	0.10
Benefit-cost ratio	1.04	2.60	3.91

Confidence Rating and Other Findings

The results produced are highly dependent on the assumptions made, some of which are uncertain. There are two factors that warrant recognition. The first factor is the coverage of benefits. Where there are multiple types of benefits it is often not possible to quantify all the benefits that may be linked to the investment. The second factor involves uncertainty regarding the assumptions made, including the linkage between the research and the assumed outcomes.

A confidence rating based on these two factors has been given to the results of the investment analysis (Table 10). The rating categories used are High, Medium, and Low, where:

High:	denotes a good coverage of benefits or reasonable confidence in the assumptions made
Medium:	denotes only a reasonable coverage of benefits or some uncertainties in assumptions made
Low:	denotes a poor coverage of benefits or many uncertainties in assumptions made

Table 10: Confidence in Analysis of Investment

Coverage of Benefits	**Confidence in Assumptions**
High	Medium

The coverage of benefits was assessed as High. The impact valued was deemed to be the most important from the investment and there were only two other, relatively minor potential impacts.

Confidence in assumptions was rated as Medium. Many of the valuation assumptions were underpinned by credible data (e.g., value of SRL fishery). However, because the investment was only recently completed, there was no evidence of actual outcomes and impacts. This meant that a number of the assumptions used in the valuation were uncertain.

Conclusions

Project 2018-205 research has delivered knowledge to the SRL industry on fisheries management that will help inform future policy making. More informed stakeholders are likely to make better decisions and avoid outcomes that erode the value of the fishery.

Total funding for the Project was $0.03 million (present value terms) and produced total expected net benefits of $0.09 million (present value terms). This produced an estimated net present value of $0.05 million, a benefit-cost ratio of 2.6 to 1, an internal rate of return (IRR) of 302.8%, and a modified IRR of 13.8% (over 30 years, using a 5% discount rate and 5% finance rate).

Given the conservative assumptions made and the fact that two impacts were not valued in monetary terms, the investment criteria reported are likely to be an underestimate of the true performance of the investment in Project 2018-205. The positive results should be viewed favourable by FRDC, the Australian Government, industry, and other RD&E stakeholders.

Glossary of Economics 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 costs:	The discounted value of investment costs.

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