FINAL REPORT

An Impact Assessment of Investment in FRDC Project 2016-224:

Boosting Fisher Returns through Smart Value-Adding and Greater Use of Underutilised Species

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

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Principal investigator Ewan Colquhoun, Ridge Partners was contacted to review the working draft.

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
BCR	Benefit-Cost Ratio
CBA	Cost-Benefit Analysis
CRRDC	Council of Rural Research and Development Corporations
DPI	Department of Primary Industries
FRDC	Fisheries Research and Development Corporation
GVP	Gross Value of Production
IRR	Internal Rate of Return
NSW	New South Wales
PVB	Present Value of Benefits
RD&E	Research, Development and Extension
RDC	Research and Development Corporation

Executive Summary

This report presents an impact assessment of investment in Fisheries Research and Development Corporation (FRDC) Project 2016-224: *Boosting Fisher Returns through Smart Value-Adding and Greater Use of Underutilised Species*. 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 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 2016-224 was to boost the returns to commercial wild-catch fishers on Australia's east coast by:

- Increasing the legal harvest and use of underutilised species; and
- Increasing fishers' margins and returns through selective value-adding.

The investment has led to a range of potential economic and social impacts. Importantly, Project 2016-224 contributed to:

- A potential increase in commercial fisher profit from Group A species – Royal Red Prawns, Australian Sardine, and Gould's Squid.
- A potential increase in supply chain profit from adding value to Group A species.
- A potential increase in regional employment in east coast fisheries.
- Increased industry and researcher capacity in relation to underutilised seafood species.
- Improved regional community wellbeing through spillover benefits from more productive and profitable fishing and value-adding businesses.
- Potentially, some contribution to maintained food security with respect to the access to, availability of, and use of seafood resources

Total funding for the Project was $0.31 million (present value terms) and produced total expected net benefits of $0.46 million (present value terms). This produced an estimated net present value of $0.15 million, a benefit-cost ratio of 1.5 to 1, an internal rate of return (IRR) of 8.2%, and a modified IRR of 6.4% (over 30 years, using a 5% discount rate and 5% finance rate).

Given the conservative assumptions made and the fact that a number of 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 2016-224. The positive results should be viewed favourable by FRDC, the Australian Government, industry, and other RD&E stakeholders.

Keywords

2016-224, Fisher Returns, Underutilised Species, Value-adding, 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 2016-224: *Boosting fisher returns through smart value adding and greater use of underutilised species*.

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

Greater use of Australia's underutilised commercial fisheries will benefit the Australian seafood industry by increasing commercial fisher productivity and profit as well as employment in regional areas. It will also reduce Australia's reliance on imported seafood.

Rationale for Project 2016-224

The FRDC RD&E Strategy notes that there is potential to increase the productivity and profitability of commercial fisheries by reducing or finding new ways of using waste; capitalising on under-valued, under-utilised or bycatch species; making harvest strategies more effective; rebuilding stocks; value adding and by improving market access and accreditation. Under-utilised species are present in both east coast Commonwealth and state fishery waters.

In 2001, the Queensland Department of Primary Industries (DPI) completed a study (FRDC 1999/347) identifying under-utilised seafood species suitable for export to growing consumer markets in Asia. Many species and markets identified in the DPI study remain under supplied. This project was to address these opportunities with a strong focus on boosting economic and competitive circumstances.

Project Details

Summary

Project Code: 2016-224

Title: *Boosting Fisher Returns through Smart Value-Adding and Greater Use of Underutilised Species*

Research Organisation: Ridge Partners

Principal Investigator: Ewan Colquhoun

Period of Funding: July 2016 to June 2020

FRDC Program Allocation: Adoption 50%, Industry 50%

Objectives

The specific objectives of project 2016-224 were to provide:

1. A demonstration to Australian fishers and enterprises of the increase in the harvest of underutilised yield in selected Australian fisheries.
2. A demonstration to Australian fishers of significant and sustainable increase in the returns to selected Australian fishermen from fishery yield growth and innovative value-adding.
3. A demonstration to Australian fishers of increased utilisation, yield, and margin of seafood product into value-added formats for new consumer markets.

Logical Framework

Table 1: Logical Framework for FRDC Project 2016-224

Activities	• Scoping of the research project with Sydney Fish Market, seafood processor Pacific West, the NSW Professional Fishers' Association, and the Australian Fisheries Management Authority. • Review of an initial list of 132 underutilised wild caught commercial species and the selection of 11 representative east coast Target Utilisation Species for in-depth investigation. All 11 species were currently harvested on a commercial basis. • Completion of project consultation with fishers, cooperatives, wholesalers, and related parties to collate knowledge and test stakeholder motivation to invest in change. • For each Target Utilisation Species desktop research was completed to document the relevant species, its attributes as a seafood, market drivers, processing procedures, product formats, value-adding research requirements, market prices and returns, export and import trade, drivers of underutilisation, and opportunities for increased utilisation. • Analysis revealed gaps in both critical knowledge and industry capacity. • Three species (Royal Red Prawn, Australian Sardines, and Gould's Squid – Group A) were found to offer potential for volume and value gains for fishers. Trials were developed to improve (i) landed product quality, (ii) product upgrades, (iii) transition from bait to consumer markets, and (iv) transition from bulk commodity seafood into consumer seafood products with supporting packaging, presentation, and promotion. • Six species (Silver Trevally, Blue Mackerel, Yellowtail Scad, Luderick, Ocean Jacket, and Sea Mullet – Group B) offer attractive commercial returns from both volume and value gains. However, at the end of the project these species had not attracted sufficient support to advance a demonstration trial. • Two species (Ribbon Fish, and Catfish/Cobbler – Group C) have not been fully assessed for volume or value-adding potential. There is insufficient information available on these species to test their commercial worth. • Commercial proponents for the Group A species were engaged by the project team to develop trials that integrated a range of market leverage objectives.

Outputs	• Commercial entities willing to trial the repositioning of Group A species (Royal Red Prawn, Australian Sardines, and Gould's Squid).
Outcomes	• A potential increase in the value of Group A species. • Increased awareness of opportunities in relation to underutilised seafood species.
Impacts (potential)	• A potential increase in commercial fisher profit from Group A species. • A potential increase in supply chain profit from adding value to Group A species. • A potential increase in regional employment in east coast fisheries. • Increased industry and researcher capacity in relation to underutilised seafood species. • Improved regional community wellbeing through spillover benefits from more productive and profitable fishing and value-adding businesses. • Potentially, some contribution to maintained food security with respect to the access to, availability of, and use of seafood resources.

Source: FRDC project documentation

Nominal Investment

Table 2 shows the total annual investment made in project 2016-224 by FRDC and other contributors. Other investors included Pacific West and Sydney Fish Market.

Table 2: Total Investment in FRDC Project 2016-224
(nominal dollar terms)

Year ended 30 June	FRDC ($)	Others ($)	Total ($)
2017	50,000	40,000	90,000
2018	45,000	40,000	85,000
Totals	**95,000**	**80,000**	**175,000**

Source: FRDC project 2016-224 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).

The cost of trials to reposition Group A species plus investment in supporting packaging, presentation, and promotion are required to realise potential project impacts.

Impacts

Table 3 provides a summary of the principal types of potential impacts from project 2016-224. 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 2016-224

Economic	• A potential increase in commercial fisher profit from Group A species. • A potential increase in supply chain profit from adding value to Group A species.
Environmental	• Nil
Social	• A potential increase in regional employment in east coast fisheries. • Increased industry and researcher capacity in relation to underutilised seafood species. • Improved regional community wellbeing through spillover benefits from more productive and profitable fishing and value-adding businesses. • Potentially, some contribution to maintained food security with respect to the access to, availability of, and use of seafood resources.

Public versus Private Impacts

Both public and private potential impacts were identified for the project. Private impacts may be delivered through a potential increase in commercial fisher and supply chain profit from underutilised Group A species. Public impacts are likely to be delivered through increased industry and researcher capacity and spillover benefits from more profitable fishing and supply chain businesses.

Distribution of Private Impacts

Private impacts from the investment in project 2016-224 will accrue to commercial fishers and the supply chain. Supply chain beneficiaries will include fish cooperatives, wholesalers, fish processors, 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

No direct impacts to other Australian industries beyond fishing and the seafood supply chain were identified.

Impacts Overseas

Trade may be impacted by the adoption of project research, with greater utilisation of Group A species, there may be a displacement of seafood imports and increased sales of Australian seafood to other countries.

In addition, the principle and approaches used for better utilisation of under-valued seafood species may be applicable to the fishing industries of other countries. This information on improved utilisation might be exchanged between fishing industries through the literature and participation in international conferences.

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 2016-224 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 2016-224 addressed outcome areas 1 and 2.

[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 2016-224 was valued – increase in commercial fisher profit from Group A species.

Valuation of Impact 1: Increase in commercial fisher profit from Group A species

Project research has identified an opportunity to reposition Group A species – Royal Red Prawn, Australian Sardine, and Gould's Squid as consumer products rather than bait. The final project report identifies potential volumes and values of these species that are available for the creation of new consumer products. Using this information, the potential increase in gross returns to commercial fishers has been estimated – Table 5.

Table 5: Potential Gain in Commercial Fisher Gross Returns for Underutilised Group A Species

Underutilised Group A species	**Beach price as consumer product ($/kg) (A)**	**Beach price as bait ($/kg) (B)**	**Net increase in beach price ($/kg) (A-B)**	**Additional volume available (tonnes)**	**Potential increase in gross returns ($).**
Royal Red Prawn	$20.00	$10.00	$10.00	300	$3.00 million
Australian Sardine	$3.40	$2.00	$1.40	5,000	$7.00 million
Gould's Squid	$3.50	$2.00	$1.50	700	$1.05 million
Total					**$11.05 million**

Source: Adapted from Colquhoun 2020. NB: beach price as bait estimated by impact assessment analyst.

The potential gain in gross returns for underutilised Group A species represents an upper bound for quantification of impact 1. It is unlikely that all of the additional volume available will be caught and fishers will incur additional costs in catching and managing Group A species for human consumption.

Additional assumptions for the valuation of the impact are reported in Table 6.

Impacts Not Valued

The impacts not valued included:

- A potential increase in supply chain profit from adding value to Group A species. Data on supply chain business costs and returns pre and post the addition of new products was not available to the impact assessment.
- A potential increase in regional employment in east coast fisheries. Estimation requires Input-Output modelling that was not part of this impact assessment.
- Increased industry and researcher capacity in relation to underutilised seafood species. Detailed study of both industry and research knowledge changes and their application is needed to estimate this benefit.
- Improved regional community wellbeing through spillover benefits from more productive and profitable fishing and value-adding businesses. Estimation requires Input-Output modelling that was not part of this impact assessment.
- Potentially, some contribution to maintained food security with respect to the access to, availability of, and use of seafood resources

Summary of Assumptions

Table 6 describes the specific assumptions used in the valuation of impacts.

Table 6: Summary of Assumptions for the Valuation of Impact 1

Impact 1: Increase in commercial fisher profit from Group A species		
Variable	**Assumption**	**Source**
Potential increase in gross returns for commercial fishers from repositioning Group A species if all additional catch is taken and value-added.	$11.05 million/year.	Table 5 above.
Share of additional Group A catch that is taken by commercial fishers and value-added.	50%.	Analyst assumption – not all the available resource will be targeted and caught.
Profit on additional Group A catch that is taken by commercial fishers and subsequently value-added for human consumption.	40%.	Analyst assumption – additional costs will be incurred by commercial fishers managing Group A species for human consumption including catch technique, labour, and post-harvest care.
First year value-added Group A products are available to Australian and Asian consumers.	2024/25.	Project completed 2019/20, product development trials completed 2023/24, and supply chain commercial adoption commences 2024/25.
Period of impact – that is thenumber of years the new value-added products remain in the market.	20 years (2043/44 is last year of impact)	Analyst assumption – consumer tastes change, and new products are required.
Attribution of impact to this project.	20%.	Analyst assumption – other studies have reviewed value-adding potential.
Risk Factors		
Probability of output	100%	Group A species identified, and commercial trials agreed.
Probability of outcome	50%	Product trials based on Group A species are incomplete.
Probability of impact	50%	Market acceptance of potential new value-added products is unknown.
Counterfactual		
It is assumed that the benefits attributable to this investment are 50% likely to have occurred in the absence of FRDC investment. This may have occurred via seafood processor investment in value-adding underutilised Group A species.		

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 (2017/18) to the final year of benefits assumed.

Investment Criteria

Tables 7 and 8 show the investment criteria estimated for different periods of benefits for the total investment and FRDC investment respectively. The present value of benefits (PVB) for the FRDC investment was estimated by multiplying the total PVB cash flow by the proportion of FRDC investment in real, undiscounted dollar terms (58.3%).

Table 7: Investment Criteria for Total Investment in Project 2016-224

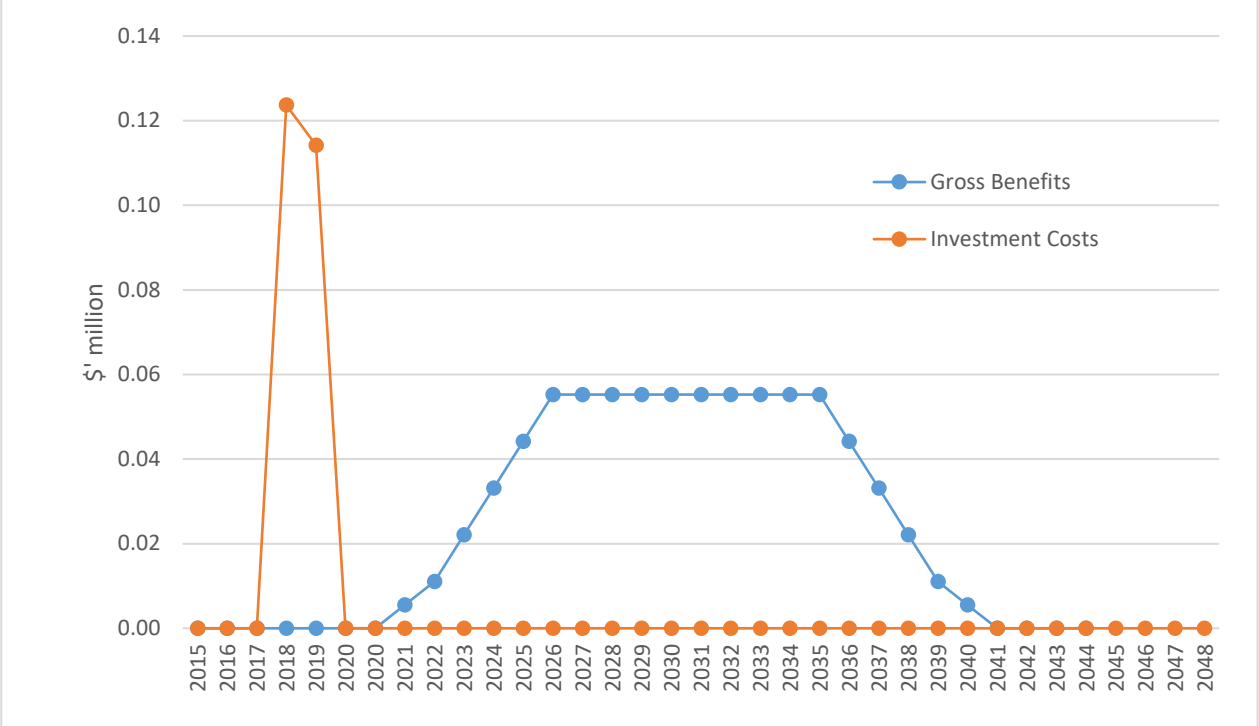
Investment criteria	**Number of years from year of last investment**						
	0	**5**	**10**	**15**	**20**	**25**	**30**
Present value of benefits ($m)	0.00	0.00	0.06	0.24	0.38	0.46	0.46
Present value of costs ($m)	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Net present value ($m)	-0.31	-0.31	-0.25	-0.07	0.07	0.14	0.15
Benefit-cost ratio	0.00	0.00	0.19	0.76	1.24	1.46	1.47
Internal rate of return (%)	negative	negative	negative	1.0	6.7	8.1	8.2
MIRR (%)	negative	negative	negative	2.0	6.1	6.7	6.4

Table 8: Investment Criteria for FRDC Investment in Project 2016-224

Investment criteria	**Number of years from year of last investment**						
	0	**5**	**10**	**15**	**20**	**25**	**30**
Present value of benefits ($m)	0.00	0.00	0.03	0.14	0.22	0.27	0.27
Present value of costs ($m)	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Net present value ($m)	-0.18	-0.18	-0.15	-0.04	0.04	0.08	0.09
Benefit-cost ratio	0.00	0.00	0.19	0.76	1.24	1.46	1.47
Internal rate of return (%)	negative	negative	negative	1.0	6.7	8.1	8.2
MIRR (%)	negative	negative	negative	2.0	6.1	6.7	6.4

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 9, showed sensitivity to the discount rate. This was largely due to the benefit cash flows occurring well into the future and therefore being subject to relatively more severe discounting. At the 10% discount rate project costs exceed project benefits.

Table 9: Sensitivity to Discount Rate
(Total investment, 30 years)

Investment Criteria	**Discount rate**		
	0%	**5% (base)**	**10%**
Present value of benefits ($m)	0.78	0.46	0.29
Present value of costs ($m)	0.24	0.31	0.40
Net present value ($m)	0.55	0.15	-0.12
Benefit-cost ratio	3.30	1.47	0.71

A sensitivity analysis then was carried out on the assumed share of additional Group A catch taken by commercial fishers for value-adding. Table 10 shows the results. The investment criteria are sensitive to changes in this assumption. If only 25% of available catch is value added with higher prices received by fishers, then project costs exceed project benefits.

Table 10: Sensitivity to the Share of Additional Catch Taken for Value-Adding
(Total investment, 5% discount rate, 30 years)

Investment Criteria	Share of Additional Catch Taken for Value-Adding		
	25%	50% (base)	100%
Present value of benefits ($m)	0.23	0.46	0.92
Present value of costs ($m)	0.31	0.31	0.31
Net present value ($m)	-0.08	0.15	0.60
Benefit-cost ratio	0.74	1.47	2.94

A final sensitivity analysis was undertaken on the increase in commercial fisher profit needed for project investment to breakeven. The results, presented in Table 11, show that commercial fisher profit would need to be at least 27% on catch destined for value-adding if project benefits were to exceed project costs.

Table 11: Sensitivity to the Increase in Profit Realised by Fishers for Catch Taken for Value-Adding
(Total investment, 5% discount rate, 30 years)

Investment Criteria	Commercial Fisher Profit on Catch for Value-Adding		
	27%	40% (base)	60%
Present value of benefits ($m)	0.31	0.46	0.69
Present value of costs ($m)	0.31	0.31	0.31
Net present value ($m)	0.00	0.15	0.38
Benefit-cost ratio	0.99	1.47	2.21

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 12). 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 12: Confidence in Analysis of Investment

Coverage of Benefits	Confidence in Assumptions
Medium	Medium

The coverage of benefits was assessed as Medium. The impact valued was deemed to be the most important from the investment.

Confidence in assumptions was rated as Medium. Many of the valuation assumptions were underpinned by credible data. 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

Documenting underutilised species' attributes and value-added opportunities builds shared knowledge but does not catch more fish (Colquhoun 2020). There are multiple reasons why shifting Group A species product position from bait to human consumption may not work. However, a valuable foundation has been laid by Project 2016-224 investment.

The investment has led to a range of potential economic and social impacts. Importantly, Project 2016-224 contributed to:

- A potential increase in commercial fisher profit from Group A species.
- A potential increase in supply chain profit from adding value to Group A species.
- A potential increase in regional employment in east coast fisheries.
- Increased industry and researcher capacity in relation to underutilised seafood species.
- Improved regional community wellbeing through spillover benefits from more productive and profitable fishing and value-adding businesses.
- Potentially, some contribution to maintained food security with respect to the access to, availability of, and use of seafood resources

Total funding for the Project was $0.31 million (present value terms) and produced total expected net benefits of $0.46 million (present value terms). This produced an estimated net present value of $0.15 million, a benefit-cost ratio of 1.5 to 1, an internal rate of return (IRR) of 8.2%, and a modified IRR of 6.4% (over 30 years, using a 5% discount rate and 5% finance rate).

Given the conservative assumptions made and the fact that a number of 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 2016-224. 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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