FRDC Annual RD&E Impact Assessment Program 2023-24

Aggregate Report

GHD Pty Ltd Sydney

13 November 2024

FRDC Project No **2023-160**

Please Note – Final Report Requirements – accessibility

Under the Disability Discrimination Act 1992, Australian Government agencies are required to ensure information and services are provided in a non-discriminatory accessible manner – the FRDC and as a result all content produced as part of our projects also need to meet these requirements.

The Web Content Accessibility Guidelines outlines ways to make digital content more accessible to the broadest audience – https://guides.service.gov.au/content-guide/accessibility-inclusivity/

While there are many aspects to this, a key focus for principal investigators is to ensure that PDF documents are accessible. To make a PDF accessible you must make sure structural elements such as headings are marked-up so that a screen reader can follow the logical order of the content. The FRDC will update the final report design standard to highlight these requirements. We are regularly working to improve what we deliver to end users and this is part of that.

FRDC Annual RD&E Impact Assessment Program 2023-24: Aggregate
Project number 2023-160

2024

Researcher Contact Details
Name: GHD Pty Ltd
Address: Level 15, 133 Castlereagh Street, Sydney, NSW, 2000
Phone: 02 92397 021
Email: susan.madden@ghd.com

FRDC Contact Details
Address: 25 Geils Court
Deakin ACT 2600
Phone: 02 6122 2100
Email: frdc@frdc.com.au
Web: www.frdc.com.au

Acknowledgments

FRDC and GHD would like to acknowledge the various researchers and industry stakeholders consulted for this project.

GHD would also like to acknowledge the Australian Government's contribution via FRDC to the project.

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABFA	Australian Barramundi Farmers' Association
AFDL	Australian Fish Disease Laboratory
ALOP	Australia's Appropriate Level of Protection
FFVS	Future Fisheries Veterinary Science
FRDC	Fisheries Research and Development Corporation
BCR	Benefit Cost Ratio
BICON	Biosecurity Import Conditions
CAAHV	Centre for Aquatic Animal Health and Vaccines (CAAHV)
CRRDC	Council of Rural Research and Development Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
GBRWHA	Great Barrier Reef World Heritage Area
GDP	Gross Domestic Product
IPNV	Infectious Pancreatic Necrosis Virus
IRR	Internal Rate of Return
ISKNV	Infectious Spleen and Kidney Necrosis Virus
ISPNV	Infectious Pancreatic Necrosis Virus
MIRR	Modified Internal Rate of Return
NQ	Northern Queensland
NPV	Net Present Value
NRET	Natural Resources and Environment Tasmania
PV	Present Value

R&D	Research and Development
RD&E	Research, Development and Extension
RDC	Research and Development Corporation
RSIV	Red Sea Bream Rridovirus
SDDV	Scale Drop Disease Virus
SGIV	Singapore grouper iridovirus
SOCI	Species of Conservation Interest
TABV	Tasmanian Aquabirnavirus
TRBIV	Turbot Reddish Body Iridovirus
DAFF	Department of Agriculture, Fisheries and Forestry (Commonwealth)

Introduction

This report presents the draft results of 18 ex-post impact assessments completed on a representative sample of Fisheries Research and Development Corporation (FRDC) projects finalised during the 2023/24 financial year.

Evaluations were completed in line with the Council of Rural Research and Development Corporations (CRRDC) Impact Assessment Program: Guidelines (2018). They were informed by a desktop review of project outputs, consultation with researchers, industry representatives, and other relevant stakeholders along with the review of relevant literature and data where necessary.

The results provide an objective and independent assessment of the qualitative and quantitative outcomes likely to be realised from the evaluated projects. Where necessary, the evaluations rely on informed estimates of unknown parameters, such as economic benefits from practice change, potential rates of adoption, and attribution of benefits.

Objectives

It is important for Rural Research and Development Corporations (RDCs) to monitor and evaluate the returns from Research, Development and Extension (RD&E) investment, as government and industry require transparency and accountability of RD&E funds.

The specific objectives of FRDC's impact assessment program are:

1. To inform FRDC's delivery of RD&E Plans and future investment decisions
2. To provide information on the return of FRDC's RD&E investment that can be used in FRDC's annual reporting to the Australian Government
3. To contribute to populating the Evaluation Framework for FRDC reporting to the Australian Government under its Statutory Funding Agreement
4. To provide FRDC input to the overall performance assessment of the RDCs being compiled by CRRDC.

Method

Economic impact evaluation

This project has been undertaken in line with guidelines and procedures for impact assessment developed by the CRRDC. As per the CRRDC Impact Assessment Program: Guidelines (2018) GHD considered and modelled the project case (with project scenario) against the counterfactual (without project scenario) for a sample of projects to determine the likely change in net economic benefit and therefore, return on investment.

GHD reviewed project reports and outputs, and consulted with key stakeholders to identify and, where possible, quantify project impacts. Where impacts were quantified, analysis was typically supported by reasonable assumptions for the following:

- Potential impact if/when project outputs and findings are utilised by the industry
- Likely rates of adoption over the coming years
- Attribution of benefits, i.e. the extent realised benefits are attributable to the project investment, as separate from previous related research, future implementation cost, and other factors.

All assumptions are outlined in the individual project evaluations (see Appendices) and were based on industry information and data where available, targeted consultation with relevant researchers, project managers and other stakeholders, and the consultant's informed judgment.

Impacts were modelled over a 30-year timeline and discounted to present-day amounts (applying 5% discount rate) to determine the:

- Net Present Value of Benefits (NPV): Net benefits minus net costs
- Benefit Cost Ratio (BCR): Net benefits divided by net costs
- Internal Rate of Return (IRR): Interest rate at which the NPV of all impacts from a project (both costs and benefits) or investment equal zero, and
- Modified Internal Rate of Return (MIRR): Similar to the above IRR, but assuming more realistic returns from reinvested benefits and financing of initial outlays (5% applied for both, as per CRRDC guidelines).

All past costs and benefits were expressed in 2023/24-dollar terms using the Implicit Price Deflator for Gross Domestic Product (GDP). For the FRDC investment, the cost of managing the FRDC funding was added to the FRDC contribution for the project using a management cost multiplier of 1.157. As per impact assessments in previous years, this multiplier was estimated based on a five-year average of the ratio of total FRDC non-project cash expenditure to project expenditure as reported in FRDC's Cash Flow Statement (FRDC Annual Reports, 2019-2023).

All costs and benefits after 2023/24 were discounted to 2023/24 dollars 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 high 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 (2023/24) to the final year of benefits assumed.

Sensitivity analysis was used to test results against changes to key assumptions and discount rates. For each evaluation, GHD also specified confidence ratings in terms of coverage of benefits and accuracy of assumptions.

Project selection

For this year's assessment, 18 projects were selected using a random sampling process. The initial list of selected projects was reviewed to ensure appropriate coverage of projects across FRDC's five outcome areas under the 2020-2025 R&D Plan, as well as to ensure representation of small (≤$75,000), medium ($75,000 - $400,000) and large (≥$400,000) sized investments. The selection of projects for 2023/24 had a total estimated value of $6,729,324 (FRDC investment, nominal dollar terms) and were funded over the period 2009/10 to 2023/24. This represented 30% of FRDC's total project investment in projects completed in 2023/24.

This aggregate report presents the draft findings from all 18 individual project assessment for 2023/24.

Results

The 18 selected projects and corresponding budgets are detailed in the Table 1 below.

Table 1 Projects selected and total budgets

Project code	Project name	Total project budget*	% FRDC contribution to budget*
2018-049	A better way to fish: testing the feasibility of tunnel net 'fish trap' gear in North Queensland	$171,138	73%
2020-088	Quantifying inter-sectoral values within and among the Indigenous, commercial and recreational sectors	$92,972	100%
2016-208	Waste to profit in urchin fisheries: developing business opportunities to ensure fishery sustainability and safeguard reef dependent fisheries from destructive urchin grazing	$126,134	43%
2019-126	Assessing the biosecurity risk of uncooked whole and eviscerated barramundi and grouper in relation to exotic viruses	$79,329	87%
2018-047	Barramundi Origins: Determining the Contribution of Stocking to the Barramundi Catch on Queensland's East Coast	$710,704	37%
2018-070	Opportunities and impacts of range extending scalefish species: understanding population dynamics, ecosystem impacts and management needs	$584,561	43%
2015-005	Determining the Susceptibility of Australian Penaeus monodon and Penaeus merguiensis to newly identified enzootic (YHV7) and exotic (YHV8 and YHV10) Yellow head virus (YHV) genotypes	$424,039	38%
2016-412	ACPF IPA: Australian Wild caught Prawn Sector RD&E Management and Communication	$599,263	100%
2014-028	Mud Cockle (Katelysia spp.) Stock Enhancement/ Restoration: Practical Implementation and Policy Evaluation	$451,816	55%
2017-038	Long-term Recovery of Trawled Marine Communities 25 years after the World's Largest Adaptive Management Experiment	$5,890,303	7%
2020-093	Discussion Papers on Seafood Traceability and Labelling	$33,000	100%
2013-022	Integrating fisher derived and fishery-independent survey data to better understand and manage the Murray Cod fishery in the Murray-Darling Basin	$1,726,071	58%

2016-020	Spatial management within the NSW ocean trawl fishery	$966,263	62%
2017-203	Risk from diarrhetic shellfish toxins and Dinophysis to the Australian shellfish industry	$330,908	73%
2020-100	Proof-of-concept for innovative new octopus shelter pot and trigger trap designs.	$165,500	60%
2019-013	Modelling environment changes and effects on wild-caught species in Queensland	$624,062	46%
2010-032	Tasmania Aquabirnavirus vaccine development: towards achieving pan-specific protection of cultured salmonids in Australia using multivalent vaccines	$1,943,784	60%
2016-253	Pearl Consortium IPA: Maximising Selection Response and Commercial Return from Genetic Selection of the Silver-Lip Pearl Oyster Pinctada maxima	$2,184,518	40%

*Not including overhead multipliers applied in analysis

Table 2 details how the selected projects are aligned with FRDC's program streams. Showing that the project selection covers all FRDC programs with a greater number of projects assessed in the environment and industry program streams.

Table 2 Count and value of projects by FRDC program allocation (stated in funding applications)

FRDC programs	Weighted count of projects*	Weighted by FRDC contribution	Weighted by total project value
Adoption	1.0	$288,433	$496,007
Communities	1.5	$509,397	$782,242
Environment	4.6	$2,262,289	$6,543,042
Industry	10.1	$3,238,953	$8,765,460
People	0.9	$282,181	$517,614
Total	**18.0**	**$6,581,253**	**$17,104,365**

FRDC also allocates key outcomes of projects. Table 3 displays a count of the key outcomes for the selected projects.

Table 3 Count of key outcomes by project allocation

Key outcome	Count by project allocation*
A culture that is inclusive and forward thinking	3
Best practices and production systems	14

Community trust	6
Fair and secure access to aquatic resources	3
Growth for enduring prosperity	13

*Most projects are allocated to more than one key outcome

Economic impact by project

The results for the 18 individual ex-post impact assessments are presented in Table 4.

Table 4 Results from impact evaluation (Total Project Investment, 30 years)

Project Code	Project Name	Present Value (PV) Costs ($m)	Present Value (PV) Benefits ($m)	Net Present Value (NPV) ($m)	Benefit Cost Ratio (BCR)
2018-049	A Better Way to Fish: Testing the Feasibility of tunnel net 'Fish Trap' Gear in North Queensland	$0.23	$0.34	$0.11	1.5
2020-088	Quantifying Inter-Sectoral Values Within and Among the Indigenous, Commercial and Recreational Sectors	$0.13	NA	NA	NA
2016-208	Waste to Profit in Urchin Fisheries: Developing Business Opportunities to Ensure Fishery Sustainability and Safeguard Reef Dependent Fisheries from Destructive Urchin Grazing	$0.17	$1.15	$0.98	6.6
2019-126	Assessing the Biosecurity Risk of Uncooked Whole and Eviscerated Barramundi and Grouper in Relation to Exotic Viruses	$0.11	$0.22	$0.11	2.0
2018-047	Barramundi Origins: Determining the Contribution of Stocking to the Barramundi Catch on Queensland's East Coast	$0.91	$6.16	$5.25	6.7
2018-070	Opportunities and Impacts of Range Extending Scalefish Species: Understanding Population Dynamics, Ecosystem Impacts and Management Needs	$0.75	$3.88	$3.13	5.2
2015-005	Determining the susceptibility of Australian *Penaeus monodon* and *Penaeus merguiensis* to	$0.59	$4.87	$4.29	8.3

	newly identified enzootic (YH7) and exotic (YHV8 and YHV10) Yellow head virus (YHV) genotypes				
2016-412	ACPF IPA: Australian Wild caught Prawn Sector RD&E Management and Communication	$0.87	$4.29	$3.42	4.9
2014-028	Mud Cockle (*Katelysia spp*.) Stock Enhancement/ Restoration: Practical Implementation and Policy Evaluation	$0.63	$3.24	$2.61	5.1
2017-038	Long-term Recovery of Trawled Marine Communities 25 Years After the World's Largest Adaptive Management Experiment	$7.55	NA	NA	NA
2020-093	Discussion Papers on Seafood Traceability and Labelling	$0.04	NA	NA	NA
2013-022	Integrating Fisher-Derived and Fishery-Independent Survey Data to Better Understand and Manage the Murray Cod Fishery in the Murray-Darling Basin	$2.40	$12.86	$10.46	5.4
2016-020	Spatial Management Within the NSW Ocean Trawl Fishery	$1.35	$4.40	$3.05	3.3
2017-203	Risk from Diarrhetic Shellfish Toxins and Dionphysis to the Australian Shellfish Industry	$0.44	NA	NA	NA
2020-100	Proof-of-Concept for Innovative New Octopus Shelter Pot and Trigger Trap Designs	$0.20	$0.15	-$0.06	0.7
2019-013	Modelling Environmental Changes and Effects on Wild-caught Species in Queensland	$0.80	$5.74	$4.94	7.2
2010-032	Tasmanian Aquabirnavirus Vaccine Development: Towards Achieving Pan-Specific Protection of Cultured Salmonids in Australia using Multivalent Vaccines	$2.75	$16.61	$13.86	6.0
2016-253	Pearl Consortium IPA: Maximising Selection Response and Commercial Return from Genetic Selection of the Silver-lip Pearl Oyster *Pinactade maxima*	$2.87	$23.53	$20.66	8.2

Note: Figures are subject to rounding errors.

Overall economic impact

The aggregated results from the project assessments over 30 years from the last year of investment (2023/24) is presented in Table 5 below.

Table 5 Summary of overall results from evaluated projects

Years from project investment (2023/24)	0	5	10	15	20	25	30
Present value (PV) of benefits ($m)	$11.84	$37.05	$56.35	$69.37	$78.12	$84.35	$87.43
Present value (PV) of costs ($m)	$22.79	$22.79	$22.79	$22.79	$22.79	$22.79	$22.79
Net present value (NPV) ($m)	-$10.95	$14.26	$33.56	$46.58	$55.33	$61.55	$64.64
Benefit Cost Ratio (BCR) (weighted average)	0.8	2.5	3.9	4.7	5.3	5.8	6.0

Note: Figures are subject to rounding errors.

Conclusion

The aggregated economic return from the initial project evaluations is estimated at 6.0 using a weighted average BCR over a 30-year period. This is a positive outcome and suggests that FRDC R&D projects concluding in the 2023/24 financial year are likely to yield substantial benefits to the fisheries industry along with its larger supply chain, the recreational fishing sector and the broader public over the coming years.

References

ABS (Australian Bureau of Statistics). (2023, October). *Australian System of National Accounts*: *annual estimates of key economic measures, including GDP, consumption, investment, income, capital stock, productivity and balance sheets*. [Online]. Retrieved from: https://www.abs.gov.au/statistics/economy/national-accounts/australian-system-national-accounts/2022-23

CRRDC (Cross Rural Research and Development Corporations). (2018, April). *Cross-RDC Impact Assessment Program: Guidelines Version 2.* The Australian Government. [Online]. Retrieved from: https://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Guidelines-V.2.pdf

FRDC (Fisheries Research and Development Corporation). (2020, October). *FRDC Annual Report, 2019–20*. Canberra. [Online]. Retrieved from: https://www.transparency.gov.au/publications/agriculture/fisheries-research-and-development-corporation/fisheries-research-and-development-corporation-annual-report-2019-20

FRDC (Fisheries Research and Development Corporation). (2021, October). *FRDC Annual Report, 2020–21*. Canberra. [Online]. Retrieved from: https://www.transparency.gov.au/publications/agriculture/fisheries-research-and-development-corporation/fisheries-research-and-development-corporation-annual-report-2020-21

FRDC (Fisheries Research and Development Corporation). (2022, October). *FRDC Annual Report, 2021–22*. Canberra. [Online]. Retrieved from https://www.transparency.gov.au/publications/agriculture/fisheries-research-and-development-corporation/fisheries-research-and-development-corporation-annual-report-2021-22

FRDC (Fisheries Research and Development Corporation). (2023, October). *FRDC Annual Report, 2022–23*. Canberra. [Online]. Retrieved from https://www.transparency.gov.au/publications/agriculture-water-and-the-environment/fisheries-research-and-development-corporation/fisheries-research-and-development-corporation-annual-report-2022-23

Appendices

Appendix	Project Code	Project Name
A	2018-049	A Better Way to Fish: Testing the Feasibility of Tunnel Net 'Fish Trap' Gear in North Queensland
B	2020-088	Quantifying Inter-Sectoral Values within and among the Indigenous, Commercial and Recreational Sectors
C	2016-208	Waste to Profit in Urchin Fisheries: Developing Business Opportunities to Ensure Fishery Sustainability and Safeguard Reef Dependent Fisheries from Destructive Urchin Grazing
D	2019-126	Assessing the Biosecurity Risk of Uncooked Whole and Eviscerated Barramundi and Grouper in Relation to Exotic Viruses
E	2018-047	Barramundi Origins: Determining the Contribution of Stocking to the Barramundi Catch on Queensland's East Coast
F	2018-070	Opportunities and Impacts of Range Extending Scalefish Species: Understanding Population Dynamics, Ecosystem Impacts and Management Needs
G	2015-005	Determining the Susceptibility of Australian Penaes mondon and Penaeus merguiensis to Newly Identified Enzootic (YHV7) and Exotic (YHV8 and YHV10) Yellow Head Virus (YHV) Genotypes
H	2016-412	ACPF IPA: Australian Wild caught Prawn Sector RD&E Management Experiment
I	2014-028	Mud Cockle (Katelysia spp.) Stock Enhancement/ Restoration: Practical Implementation and Policy Evaluation
J	2017-038	Long-term Recovery of Trawled Marine Communities 25 Years After the World's Largest Adaptive Management Experiment
K	2020-093	Discussion Papers on Seafood Traceability and Labelling
L	2013-022	Integrating Fisher-Dervied and Fishery-Independent Survey Data to Better Understand and Manage the Murray Cod Fishery in the Murray-Darling Basin
M	2016-020	Spatial Management within the NSW Ocean Trawl Fishery
N	2017-203	Risk from Diarrhtic Shellfish Toxins and Dinophysis to the Australian Shellfish Industry
O	2020-100	Proof-of-Concept for Innovative New Octopus Shelter Pot and Trigger Trap Designs
P	2019-013	Modelling Environmental Changes and Effects on Wild-Caught Species in Queensland
Q	2010-032	Tasmanian Aquabirnavirus Vaccine Development: Towards Achieving Pan-Specific Protection of Cultured Salmonids in Australia Using Multivalent Vaccines
R	2016-253	Pearl Consortium IPA: Maximising Selection Response and Commercial Return from Genetic Selection of the Sliver-Lip Pearl Oyster Pinctada maxima