



FRDC

FISHERIES RESEARCH &
DEVELOPMENT CORPORATION

FINAL REPORT

An Impact Assessment of Investment in FRDC Project 2014-405:

**Oysters Australia Industry Partnership Agreement:
Australian Edible Oysters RD&E Investment via Oysters Australia
Strategic Plan 2014-19**

**Peter Chudleigh, Agtrans Pty Ltd and
Talia Hardaker, ACRE Economics Pty Ltd**

January 2023

FRDC Project No 2016-134

© 2022 Fisheries Research and Development Corporation.
All rights reserved.

ISBN [Insert ISBN/ISSN – researcher to obtain]

**An Impact Assessment of Investment in FRDC Project 2014-405: Oysters Australia Industry Partnership Agreement: Australian Edible Oysters RD&E Investment via Oysters Australia Strategic Plan 2014-19
FRDC Project 2016-134**

2022

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, **ACRE Economics, and Agtrans Research.**

This publication (and any information sourced from it) should be attributed to **Hardaker, T., ACRE Economics, and Chudleigh, P., Agtrans Research, 2022, An Impact Assessment of Investment in FRDC Project 2014-405: Oysters Australia Industry Partnership Agreement: Australian Edible Oysters RD&E Investment via Oysters Australia Strategic Plan 2014-19, Canberra ACT, June. 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 <https://creativecommons.org/licenses/by/3.0/au/>. The full licence terms are available from <https://creativecommons.org/licenses/by-sa/3.0/au/legalcode>.

Inquiries regarding the licence and any use of this document should be sent to: 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: 5-9 Trout Court, New Beith QLD 4124
Phone: 0437 959 690
Fax: Not applicable
Email: talia.hardaker@acreeconomics.com.au

FRDC Contact Details

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

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

Contents

Acknowledgments	v
Abbreviations	v
Executive Summary	vi
Introduction	7
Method	8
Project Background	9
Background	9
Rationale for Project 2014-405.....	9
Project Details	10
Summary	10
Objectives	10
Logical Framework	10
Nominal Investment	12
Management and Administration Costs	12
Real Investment and Extension Costs	12
Impacts	13
Public versus Private Impacts	13
Distribution of Private Impacts	13
Impacts on other Australian industries.....	13
Impacts Overseas	13
Match with National Priorities.....	14
Valuation of Impacts	16
Impacts Valued.....	16
Impacts Not Valued.....	16
Summary of Assumptions	16
Results	18
Investment Criteria	18
Sensitivity Analyses	19
Confidence Rating and Other Findings	20
Conclusions	21
Glossary of Economics Terms	22
References	23

Tables

Table 1: Logical Framework for FRDC Project 2014-405	10
Table 2: Total Investment in FRDC Project 2014-405 (nominal dollar terms).....	12
Table 3: Principal Potential Impact Types from Investment in FRDC Project 2014-405	13
Table 4: Australian R&D Priorities	14
Table 5: Summary of Assumptions for the Valuation of Impact 1	17
Table 6: Investment Criteria for Total Investment in Project 2018-207	18
Table 7: Investment Criteria for FRDC Investment in Project 2018-207	18
Table 8: Sensitivity to Discount Rate (Total investment, 30 years).....	19
Table 9: Sensitivity to the RD&E Efficiency Dividend (Total investment, 5% discount rate, 30 years)	20
Table 10: Confidence in Analysis of Investment	20

Figures

Figure 1: Annual Cash Flow of Undiscounted Total Benefits and Total Costs.....	19
--	----

Acknowledgments

Agtrans Research and Consulting would like to thank Patrick Hone (Managing Director), Jennifer Marshall (Cross-Functional Facilitator), and Wayne Hutchinson (Research Portfolio 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.

Specific acknowledgments also are made to:

- Rachel King, Executive Officer (former), Oysters Australia

Abbreviations

CBA	Cost-Benefit Analysis
CRC-P	Cooperative Research Centre Project
CRRDC	Council of Rural Research and Development Corporations
FRDC	Fisheries Research and Development Corporation
IPA	Industry Partnership Agreement
OA	Oysters Australia
POMS	Pacific Oyster Mortality Syndrom
R&D	Research and Development
RD&E	Research, Development and Extension
SCRC	Seafood Cooperative Research Centre

Executive Summary

This report presents an impact assessment of investment in Fisheries Research and Development Corporation (FRDC) investment in Project 2014-405: *Oysters Australia (OA) Industry Partnership Agreement (IPA) Australian Edible Oysters RD&E Investment via Oysters Australia Strategic Plan 2014-19*. The assessment was completed as part of a fifth annual series of impact assessments under the FRDC 2015-2020 Research, Development and Extension Plan. The fifth series of assessments included 20 randomly selected FRDC investments worth a total of approximately \$5.30 million (nominal FRDC investment) and that were selected from an overall population of 81 FRDC investments worth an estimated \$17.66 million (nominal FRDC investment) where a final deliverable had been submitted in the 2019/20 financial year.

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

The investment in Project 2014-405 and development of the Oysters Australia Strategic Plan 2014-19 contributed to improved management of RD&E project development between and with OA's member states and improved coordination of, and access to, funding for OA RD&E goals.

Project 2014-405 is likely to have led to positive economic impacts including increased efficiency and/or effectiveness of oyster RD&E resource allocation, and potentially, improved long-term productivity and/or profitability of the Australian oyster industry.

Total funding for the Project was \$0.51 million (present value terms). One direct impact was valued and generated estimated total net benefits of \$0.92 million (present value terms). This produced an estimated net present value of \$0.41 million, a benefit-cost ratio of 1.8 to 1, and a MIRR of 14.5% (over 30 years, using a 5% discount rate and 5% finance rate).

Given the conservative assumptions made and the fact that only one of two impacts identified was valued in monetary terms, the investment criteria reported are likely to be an underestimate of the true performance of the investment in Project 2014-45. The positive results should be viewed favourable by FRDC, the Australian Government, industry, and other RD&E stakeholders.

Keywords

2014-405, Oysters Australia, Industry Partnership Agreement, Strategic Plan, evaluation, impact assessment, cost-benefit analysis

Introduction

The Fisheries Research and Development Corporation (FRDC) required an annual series of impact assessments to be carried out on a sample of completed investments from 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 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 April 2017, FRDC commissioned Agtrans Pty Ltd (Agtrans) to undertake the annual impact assessments for RD&E projects funded under the FRDC 2015-2020 RD&E Plan and completed in the years ended 30 June 2016 to 2020 (FRDC Project 2016-134). Between 2016/17 and 2020/21, four series of annual impact assessments were completed. Each of the four series of assessments included a set of 20 randomly selected FRDC RD&E investments as well as an aggregate analysis across all 20 investments evaluated in each year. Published reports for the annual FRDC evaluations can be found at: <https://www.frdc.com.au/frdc-project-impact-assessments-benefits-research>.

The fifth and final series of impact assessments under Project 2016-134 was for a set of FRDC RD&E investments completed in the year ended 30 June 2020, the final year of the FRDC 2015-2020 RD&E Plan. As in previous years, the fifth series of impact assessments included 20 randomly selected FRDC RD&E investments. The 20 investments had a total value of approximately \$5.30 million (nominal FRDC investment) and were selected from an overall population of 81 FRDC investments worth an estimated \$17.66 million (nominal FRDC investment) where a final deliverable had been submitted in the 2019/20 financial year.

The 20 RD&E 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 30.0% 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 (total nominal FRDC investment of \leq \$50,000, \$50,001 to \$250,000, and $>$ \$250,000 respectively).

Project 2014-405: *Oysters Australia Industry Partnership Agreement (IPA) Australian Edible Oysters RD&E Investment via Oysters Australia Strategic Plan 2014-19* was randomly selected as one of the 20 RD&E investments completed in 2019/20 for evaluation in the fifth series of annual impact assessments (2019/20 sample). The current report presents the Project 2014-405 analysis and findings.

Method

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 Seafood Cooperative Research Centre (SCRC) supported national leadership and coordination of oyster R&D from 2007 to 2015 (SCRC, n.d.). The SCRC closed in June 2015; however, during the last year of the SCRC, Oysters Australia Ltd (OA) was established as an industry owned company with the primary purpose of continuing the national coordination of oyster RD&E as the industry's peak national body.

Industry Partnership Agreements (IPAs) are an agreement between FRDC and a sector body to manage a suite of sectoral projects over a specified time period against an agreed industry strategic plan. The priorities and projects selected are generally identified by the industry body and are specific to its needs (FRDC, n.d.). For an industry sector to be able to enter into an IPA, certain criteria need to be fulfilled. These sectors generally have a substantial AGVP, are coordinated in their approach, maintain RD&E plans, and are able to facilitate the extension of the results of RD&E. The OA arrangement was consistent with FRDC's policy of encouraging self-determination by industries, by providing funds through IPAs.

Rationale for Project 2014-405

In 2014/15, OA entered into an IPA with the FRDC for the period 1 July 2014 to 30 June 2019 (five years). Project 2014-405 was funded to provide financial support to OA for management and extension methods required for effective Australian edible oyster industry RD&E under the IPA.

Project Details

Summary

Project Code: 2014-405

Title: *Oysters Australia (OA) Industry Partnership Agreement (IPA) Australian Edible Oysters RD&E Investment via Oysters Australia Strategic Plan 2014-19*

Research Organisation: Oysters Australia

Principal Investigator: Rachel King, Executive Officer, Oysters Australia

Period of Funding: July 2015 to March 2020

FRDC Program Allocation: Adoption 100%

Objectives

The specific objectives of project 2014-405 were:

1. Manage project development between and with OA's member states.
2. Manage and coordinate access to most suitable funding sources for RD&E goals.
3. Maintain cohesion and strategic direction of the Oyster Australia research and development (R&D) group through a strategic plan.
4. Implement a multimedia communications package for growers and researchers and enable two-way communication through the investment process.

Logical Framework

Table 1: Logical Framework for FRDC Project 2014-405

Activities	<ul style="list-style-type: none">• IPA funding under project 2014-405 primarily went to OA operating and management costs required to deliver IPA outputs.• This included funding for executive support through the OA Executive Officer, travel and accommodation costs for extension activities, and development and implementation of an OA RD&E communications package.• OA managed the funding of 29 oyster RD&E projects to the value of approximately \$10.96 million (Jennifer Marshall, pers. comm., 2022). The IPA was involved in all but three of these projects.• The majority of the RD&E projects supported by the IPA were consistent with the priorities of the Oyster Australia Strategic Plan 2014-2019.• However, within a year of completion of the strategic plan, and six months after the commencement of the IPA, the industry suffered a major outbreak of the disease Pacific Oyster Mortality Syndrome (POMS). As a consequence, some elements of the strategic plan were suspended.• At the commencement of the IPA, a communication/extension plan was proposed with the following elements:<ol style="list-style-type: none">a) Attendance at annual state oyster grower meetings, with bolt on focused topics, eg benchmarking when neededb) Virtual news bulletins (eNews, blog site)c) Quarterly updates to OA member Executivesd) Video news, a short version of the full Seafood Industry News used in the SCRCe) An annual, single-page report to growers on each project that detailed the return on investment expected.
------------	---

	<ul style="list-style-type: none"> • This level of communications activity attempted to emulate the communications conducted during the SCRC. However, OA did not have the human resources or the finances to conduct the activities. • A formal communications plan was not produced. However, a range of communications activities were undertaken. • The main method of communication involved the OA Executive Officer giving presentations to annual grower meetings. • Also, many of the individual projects conducted their own communications to reach end-users of their research. • OA also performed a coordinating role for the State Industry bodies for three major national oyster issues during the period of the IPA: <ul style="list-style-type: none"> 1) POMS outbreak emergency support, 2) The aquatic animal emergency disease response agreement, and 3) The National Aquaculture Council. • Development of a new Strategic Plan was not completed during the initial IPA period; however, plans were in place to prepare the Plan in early 2020 and a new Plan for 2020-2025 was completed and implemented in 2020.
Outputs	<ul style="list-style-type: none"> • At the time the final report for project 2014-405 was submitted, 22 of the 29 projects managed by OA were completed or substantially completed. • The projects included several small cross sectoral investments involving biosecurity as well as numerous cross-jurisdictional projects funded through the Future Oysters Cooperative Research Centre Project (CRC-P). • Further, despite the outbreak and prioritisation of POMS, many of the projects funded and managed by OA through the IPA aligned with the objectives of the Oyster Industry Strategic Plan 2014-2019. • A range of extension activities were undertaken, primarily through presentations at industry events by the OA Executive Officer. • As part of the IPA, the industry made voluntary contributions from each oyster growing jurisdiction to FRDC RD&E funding. • Plans were put in place to develop and implement a new Strategic Plan 2020-2025.
Outcomes	<ul style="list-style-type: none"> • Project 2014-405 contributed to: <ul style="list-style-type: none"> i) Improved management of RD&E project development between and with OA's member states. ii) Improved coordination of, and access to, funding for OA RD&E goals. iii) Maintained cohesion and strategic direction of the OA R&D group through the Oyster Industry Strategic Plan. iv) Consistent and coordinated communication of OA activities and RD&E outputs to industry. v) Facilitating two-way communication between industry and researchers.
Impacts	<ul style="list-style-type: none"> • Increased efficiency and/or effectiveness of oyster RD&E resource allocation. • Potentially, some contribution to the long-term productivity and/or profitability of the Australian oyster industry through increased adoption of RD&E outputs because of improved coordination and communication of RD&E through the IPA.

Source: FRDC project documentation

Nominal Investment

Table 2 shows the total annual investment made in project 2014-405 by FRDC. No other partners contributed funding to the project.

Table 2: Total Investment in FRDC Project 2014-405
(nominal dollar terms)

Year ended 30 June	FRDC (\$)
2016	82,592
2017	35,488
2018	36,198
2019	36,920
2020	47,499
Totals	238,997

Source: FRDC project 2014-405 project agreement and financial acquittal

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, 2017-2021). This multiplier then was applied to the nominal investment by FRDC shown in Table 2. FRDC contributed 100% of the funding for project 2014-405.

Real Investment and Extension Costs

For the purposes of the impact analysis, the investment costs of all parties were expressed in 2020/21 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2021).

No additional costs of extension were included and project 2014-405 included a range of specific extension activities, primarily through presentations to industry by the OA Executive Officer.

Impacts

Table 3 provides a summary of the principal types of potential impacts from project 2014-405. Impacts have been taken, and potentially expanded, 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 2014-405

Economic	<ul style="list-style-type: none">• Increased efficiency and/or effectiveness of oyster RD&E resource allocation through enhanced development, coordination, funding and management of RD&E investment through the OA IPA.• Potentially, some contribution to the long-term productivity and/or profitability of the Australian oyster industry through increased adoption of RD&E outputs because of improved coordination and communication of RD&E through the IPA.
Environmental	<ul style="list-style-type: none">• Nil
Social	<ul style="list-style-type: none">• Nil

Public versus Private Impacts

Both public and private potential impacts were identified for the project. Private impacts may be delivered through increased efficiency/effectiveness of industry RD&E resource allocation and, potentially, maintained long-term profitability/productivity for the Australian oyster industry through increased adoption of RD&E outputs.

Public impacts are likely to be delivered through increase efficiency/effectiveness of public RD&E resource allocation (e.g. through Commonwealth Government matching funds through the FRDC).

Distribution of Private Impacts

Private impacts from the investment in project 2014-405 will primarily accrue to Australian oyster growers. Over the longer-term, private impacts may also extend to other stakeholders along the oyster supply chain such as input providers, producers, processors, wholesalers, retailers, and consumers. Such impacts would be distributed according to relevant short- and long-term supply and demand elasticities.

Impacts on other Australian industries

No direct impacts to other Australian industries were identified. However, over the longer-term, some indirect impacts may accrue to other fishing and aquaculture industries through spillover benefits from knowledge sharing from RD&E managed through OA under the IPA.

Impacts Overseas

No significant or direct impacts to overseas parties are expected.

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 2014-405 indirectly contributed to National Science and Research Priorities 1 and 2. Further, the RD&E investment may contribute indirectly to all four Agricultural Innovation Priorities through increased efficiency and/or effectiveness of oyster RD&E resource allocation.

Table 4: Australian R&D Priorities

Australian Government	
National Science and Research Priorities ¹	National Agricultural Innovation Priorities ²
<ol style="list-style-type: none"> 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. 	<p>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.</p> <ol style="list-style-type: none"> 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.

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.

FRDC National RD&E Priorities

Through extensive consultation, the FRDC 2015-2020 RD&E Plan identified three national RD&E priorities to focus and direct FRDC investments. The three FRDC national RD&E priorities were:

1. Ensuring that Australian fishing and aquaculture products are sustainable and acknowledged to be so.
2. Improving productivity and profitability of fishing and aquaculture.
3. Developing new and emerging aquaculture growth opportunities.

Project 2014-405 is likely to indirectly address all three FRDC national RD&E through increased efficiency and/or effectiveness of oyster RD&E resource allocation and potentially increasing the long-term productivity and/or profitability of the Australian oyster industry.

Valuation of Impacts

The valuation of impacts generally focused on direct impacts of the investment in project 2009-324. 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

One of the two impacts of investment in project 2014-405 were selected for valuation. The impact valued was increased efficiency and/or effectiveness of oyster RD&E resource allocation through enhanced development, coordination, funding and management of RD&E investment through the OA IPA.

Valuation of Impact 1: Increased efficiency and/or effectiveness of oyster RD&E

Over a four-year period, OA managed the funding of 33 oyster RD&E projects to the value of \$10.1 million (nominal dollars). This was equivalent to approximately \$2.5 million invested per annum. It was assumed that the investment in project 2014-405 contributed to enhanced development, coordination, funding and management of oyster RD&E investment through the OA IPA and that this, in turn, lead to improved efficiency and/or effectiveness of the oyster RD&E investment over the IPA period.

It was assumed the maximum impact would be achieved in 2015/16 and last for the duration of the initial OA IPA and project 2014-405 (completed in March 2020). After this period, it was assumed that, with no further investment, the impact would decrease to zero by 2023 as the impact of the information and priorities produced by the investment wanes.

Specific assumptions for the valuation of Impact 1 are reported in Table 5.

Impacts Not Valued

The impact not valued was the potential contribution to the long-term productivity and/or profitability of the Australian oyster industry through increased adoption of RD&E outputs because of improved coordination and communication of RD&E through the IPA.

Summary of Assumptions

The following tables present the specific assumptions used in the valuation of Impact 1.

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

Impact 1: Increased efficiency/effectiveness of oyster RD&E		
Variable	Assumption	Source
Estimated annual investment in oyster RD&E	\$2.5 million	Based on OA managed RD&E over the IPA period.
Efficiency dividend attributable to the investment in project 2014-405	5.0%	Analyst estimate – represents the increased efficiency of oyster RD&E resource allocation
First year of impact	2015/16	First year of the OA IPA with project 2014-405
Period of impact	5 years (to 2019/20) then decreasing to zero by 2022/23	Based on submission of project 2014-405 final report in March 2020
Risk Factors		
Probability of output	100%	Based on successful completion of project 2014-405
Probability of outcome	90%	The probability of outcome refers to the likelihood that activities and outputs of project 2014-405 were used to contribute to increased efficiency of oyster RD&E resource allocation
Probability of impact	90%	Allows for exogenous factors that may affect the estimated benefits being achieved (e.g. market factors affecting industry priorities)
Counterfactual		
It was assumed that, without the investment in FRDC project 2014-405, the benefits estimated would not have occurred.		

Results

All past costs and benefits were expressed in 2020/21-dollar terms. All costs and benefits were discounted to 2021/22 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

Tables 6 and Table 7 show the investment criteria estimated for different periods of benefits for the total investment and FRDC investment respectively. FRDC contributed 100% of project funding, therefore the investment criteria in Table 6 and Table 7 are the same.

Table 6: Investment Criteria for Total Investment in Project 2018-207

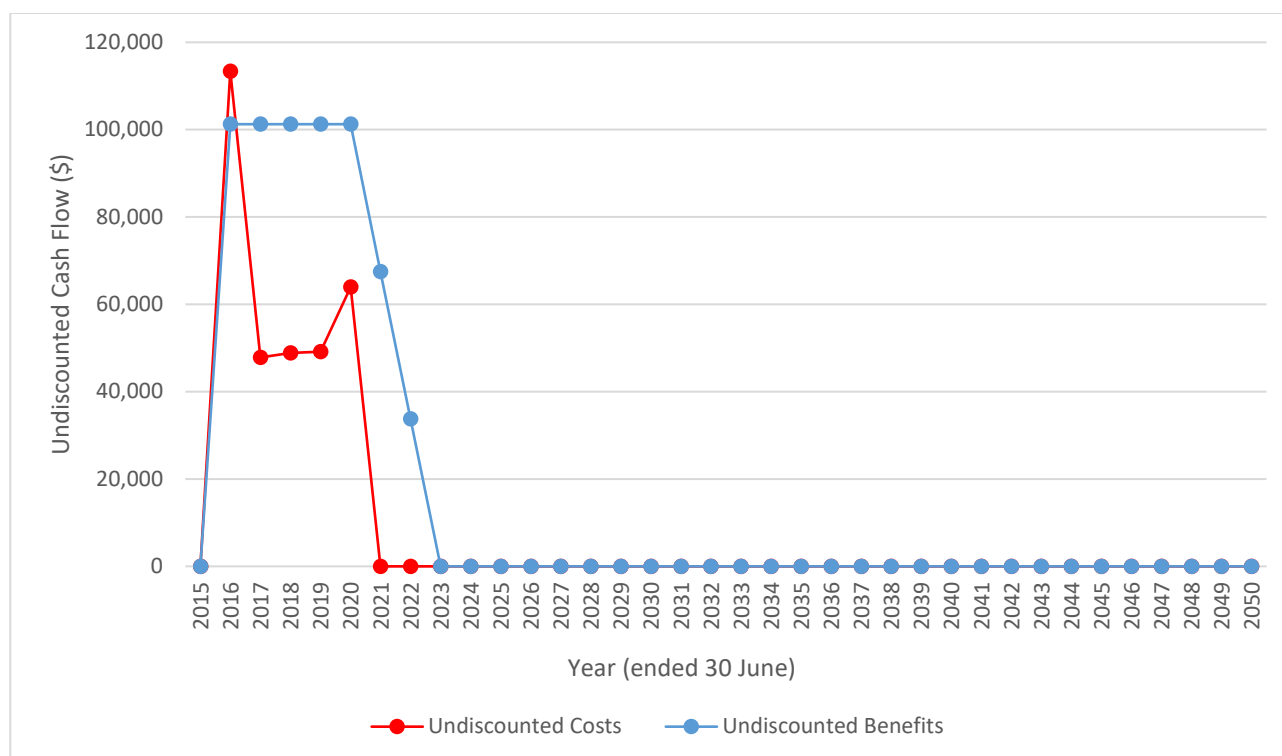
Investment criteria	Number of years from year of last investment						
	0	5	10	15	20	25	30
Present value of benefits (\$m)	0.79	0.92	0.92	0.92	0.92	0.92	0.92
Present value of costs (\$m)	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Net present value (\$m)	0.28	0.41	0.41	0.41	0.41	0.41	0.41
Benefit-cost ratio	1.54	1.80	1.80	1.80	1.80	1.80	1.80
Internal rate of return (%)	negative	negative	negative	negative	negative	negative	negative
MIRR (%)	79.0	42.3	28.6	22.2	18.6	16.2	14.5

Table 7: Investment Criteria for FRDC Investment in Project 2018-207

Investment criteria	Number of years from year of last investment						
	0	5	10	15	20	25	30
Present value of benefits (\$m)	0.79	0.92	0.92	0.92	0.92	0.92	0.92
Present value of costs (\$m)	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Net present value (\$m)	0.28	0.41	0.41	0.41	0.41	0.41	0.41
Benefit-cost ratio	1.54	1.80	1.80	1.80	1.80	1.80	1.80
Internal rate of return (%)	negative	negative	negative	negative	negative	negative	negative
MIRR (%)	79.0	42.3	28.6	22.2	18.6	16.2	14.5

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 variable 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 8, showed a low sensitivity to the discount rate. This was largely because both the benefit and cost cash flows occur within a short time period around year zero (last year of investment) and therefore were not subject to significant discounting.

Table 8: Sensitivity to Discount Rate
(Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present value of benefits (\$m)	0.61	0.92	1.38
Present value of costs (\$m)	0.32	0.51	0.79
Net present value (\$m)	0.28	0.41	0.59
Benefit-cost ratio	1.88	1.80	1.74

A sensitivity analysis then was carried out on the assumed RD&E efficiency dividend. Table 9 shows the results. The investment criteria showed a moderate sensitivity to the assumed RD&E efficiency dividend and this assumption was a main driver of the investment criteria. A break-even analysis demonstrated that the investment criteria remain positive (a benefit-cost ratio equal to or greater than 1 to 1) at a RD&E efficiency dividend value of approximately 2.8%.

Table 9: Sensitivity to the RD&E Efficiency Dividend
(Total investment, 5% discount rate, 30 years)

Investment Criteria	RD&E Efficiency Dividend		
	2.5%	5% (base)	10%
Present value of benefits (\$m)	0.46	0.92	1.84
Present value of costs (\$m)	0.51	0.51	0.51
Net present value (\$m)	-0.05	0.41	1.33
Benefit-cost ratio	0.90	1.80	1.84

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-Low

The coverage of benefits was assessed as High. One of two impacts identified was valued and the impact valued was deemed to represent the most direct and important impact of the investment in Project 2014-405.

Confidence in assumptions was rated as Medium-Low. Some of the valuation assumptions were directly based on credible data, published research and/or expert opinion. However, because the investment was only recently completed, there was little to no evidence of actual outcomes and impacts. This meant that a number of the assumptions used in the valuation were uncertain.

Conclusions

The investment in Project 2014-405 and development of the Oysters Australia Strategic Plan 2014-19 contributed to improved management of RD&E project development between and with OA's member states and improved coordination of, and access to, funding for OA RD&E goals.

Project 2014-405 is likely to have led to positive economic impacts including increased efficiency and/or effectiveness of oyster RD&E resource allocation, and potentially, improved long-term productivity and/or profitability of the Australian oyster industry.

Total funding for the Project was \$0.51 million (present value terms). One direct impact was valued and generated estimated total net benefits of \$0.92 million (present value terms). This produced an estimated net present value of \$0.41 million, a benefit-cost ratio of 1.8 to 1, and a MIRR of 14.5% (over 30 years, using a 5% discount rate and 5% finance rate).

Given the conservative assumptions made and the fact that only one of two impacts identified was valued in monetary terms, the investment criteria reported are likely to be an underestimate of the true performance of the investment in Project 2014-45. 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.

References

- Agtrans Research. (2019). *Cross-RDC Impact Assessment 2019*. Canberra ACT: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/impact-assessment-and-performance/>
- Agtrans Research; AgEconPlus; and EconSearch. (2016). *Cross-RDC Impact Assessment and Performance Reporting Update*. Canberra ACT: Council of Rural Research and Development Corporations. Retrieved from <http://www.ruralrdc.com.au/impact-assessment-and-performance/>
- Australian Bureau of Agricultural and Resource Economics and Sciences. (2021, October 6). *Fisheries and Aquaculture Statistics 2020*. Retrieved from Australian Government - Department of Agriculture, Water and the Environment ABARES: <https://www.awe.gov.au/abares/research-topics/fisheries/fisheries-and-aquaculture-statistics#download-full-report>
- Australian Government. (2015, May). Science and Research Priorities. *Science*. Department of Industry, Science, Energy and Resources. Retrieved from <https://www.industry.gov.au/data-and-publications/science-and-research-priorities>
- Australian Seafood Cooperative Research Centre. (n.d.). *About Us*. Retrieved from Australian Seafood Cooperative Research Centre: <https://www.seafoodcrc.com/main-menu/about-us.html>
- Council of Rural Research and Development Corporations. (2018). *Cross-RDC Impact Assessment Program: Guidelines*. Canberra ACT: Council of Rural Research and Development Corporations. Retrieved January 2022, from http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Guidelines-V.2.pdf
- Department of Agriculture, Water and the Environment. (2019, November 4). *Rural Research, Development and Extension Priorities*. Retrieved from Australian Government - Department of Agriculture, Water and the Environment: <https://www.awe.gov.au/agriculture-land/farm-food-drought/innovation/priorities>
- Fisheries Research and Development Corporation. (2017). *Annual Report 2016-17*. Canberra ACT: Fisheries Research and Development Corporation. Retrieved from <https://www.frdc.com.au/annual-reports>
- Fisheries Research and Development Corporation. (2018). *Annual Report 2017-18*. Canberra ACT: Fisheries Research and Development Corporation. Retrieved from <https://www.frdc.com.au/annual-reports>
- Fisheries Research and Development Corporation. (2019). *Annual Report 2018-19*. Canberra ACT: Fisheries Research and Development Corporation. Retrieved from <https://www.frdc.com.au/annual-reports>
- Fisheries Research and Development Corporation. (2020). *Annual Report 2019-20*. Canberra ACT: Fisheries Research and Development Corporation. Retrieved from <https://www.frdc.com.au/annual-reports>
- Fisheries Research and Development Corporation. (2021). *Annual Report 2020-21*. Canberra ACT: Fisheries Research and Development Corporation. Retrieved from <https://www.frdc.com.au/annual-reports>
- Fisheries Research and Development Corporation. (n.d.). *Industry Partnership Agreements (IPAs)*. Retrieved from Fisheries Research and Development Corporation: <https://www.frdc.com.au/industry-partnerships-ipas>
- Holbrook, J. A., Wixted, B., Chee, F., Klingbeil, M., & Shaw-Garlock, G. (2009). Measuring the Return on Investment in Research in Universities: The Value of Human Capital Produced by these Programs. *Vancouver BC: CPROST Report*. Retrieved from <http://www.sfu.ca/sfublogs-archive/departments/cprost/uploads/2012/10/0903.pdf>

Mariotti, M., & Meinecke, J. (2011, August). Bounds on the Return to Education in AUstralia using Ability Bias. *Working Paper in Economics & Econometrics*. Australian National University. Retrieved from <https://www.cbe.anu.edu.au/researchpapers/econ/wp551.pdf>