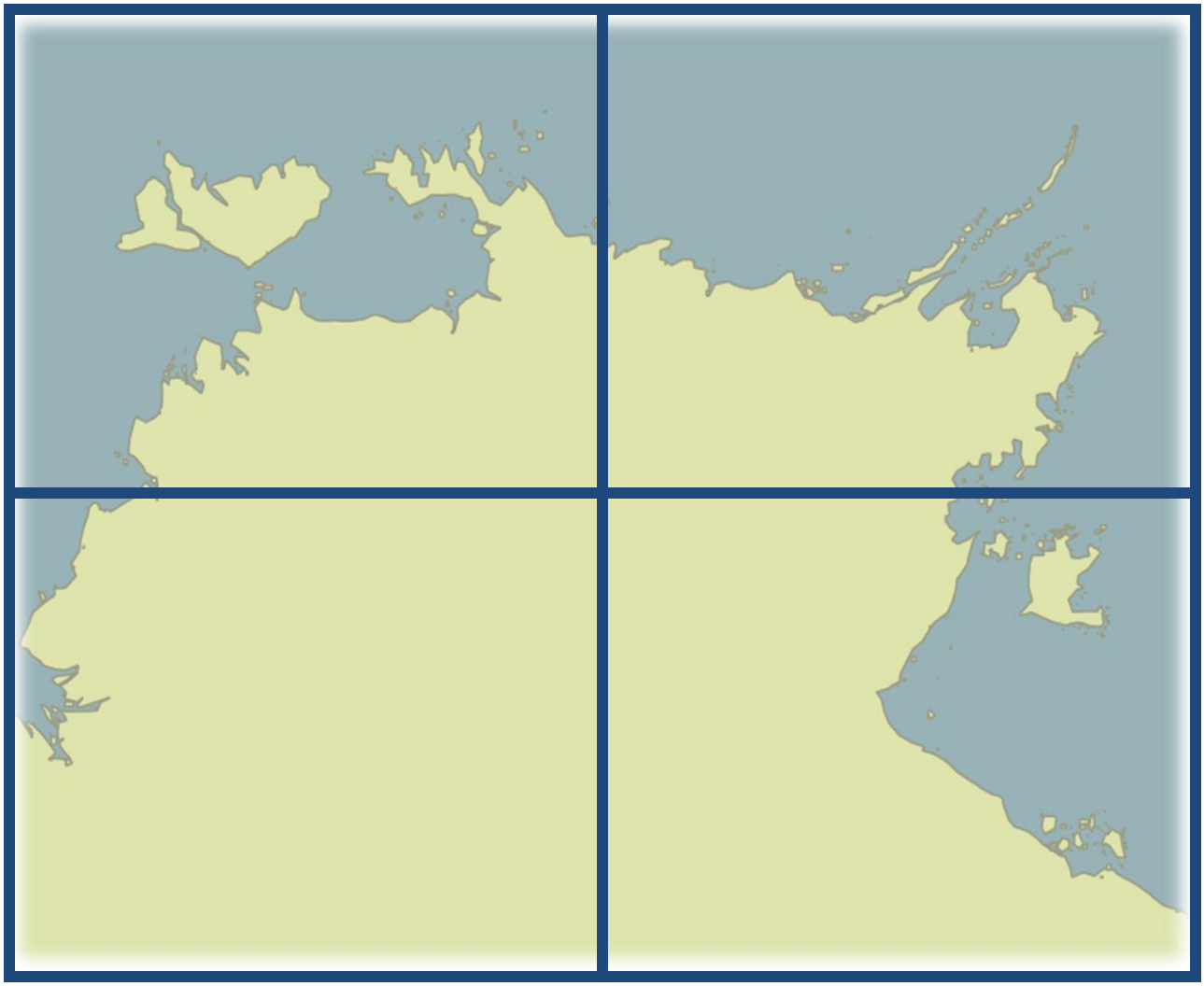
Australian Government
Fisheries Research and Development Corporation

A 5-year Strategic Research, Development and Extension Plan for Northern Territory fisheries and aquaculture



Ian Knuckey, Matt Koopman and Chris Calogeras

2019

FRDC Project 2016-116

fishwell
CONSULTING

A 5-year Strategic Research, Development and Extension Plan for Northern Territory fisheries and aquaculture

Ian Knuckey, Matt Koopman and Chris Calogeras

2019

FRDC Project 2016-116

ISBN 978-0-6480172-7-1

Title: Development of a 5-year Strategic Research, Development and Extension Plan for Northern Territory fisheries and aquaculture

FRDC Project 2016/116

2019

This publication (and any information sourced from it) should be attributed to Knuckey, I., Koopman, M. and Calogeras, C. (2019). Development of a 5-year Strategic Research, Development and Extension Plan for Northern Territory fisheries and aquaculture based on priority needs of major stakeholder sectors. FRDC Project 2016/116. Fishwell Consulting 118 pp.

Researcher Contact Details

Name:	Ian Knuckey
Address:	Fishwell Consulting
	27A Hesse St, Queenscliff, VIC 3225
Phone:	+61 3 5258 4399
Fax:	+61 3 5258 4399
Email:	ian@fishwell.com.au
Web:	www.fishwell.com.au/

FRDC Contact Details

Address:	25 Geils Court
	Deakin ACT 2600
Phone:	02 6285 0400
Fax:	02 6285 0499
Email:	frdc@frdc.com.au
Web:	www.frdc.com.au

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

Table of Contents

List of Figures

List of Tables

Acknowledgments

We appreciate the time the following people have given us in development of the online surveys, and for meeting with us to discuss research direction: Matt Osborne (NTDPIR), David Ciaravolo and board members (AFANT), Katherine Winchester and board members (NTSC), Heidi Mumme (Paspaley Pearls), Natasha Stacey (Charles Darwin University), Rik Buckworth (NTRAC Chair), Ricky Archer and Glenn James (NAILSMA), Will Bowman (NTDPIR), Mark Grubert (NTDPIR), Evan Needham (NTDPIR), Clem Bresson (Bawinanga Aboriginal Corporation), Shane Penny (NTDPIR), Phil Hall (NTDPIR), Luke Playford (Dhimurru Aboriginal Corporation), Dennis Sten (NTGFA), Members of the King Ash Bay Fishing Club, Anthony Simms (NLC), Terry Yumbulul, Glenn Hurry, Diane Brodie. We would also like to thanks the hundreds of respondents of the online surveys.

This project was funded by the Australian Government through the Fisheries Research and Development Corporation. We particularly appreciate the time of FRDC personal including Nicole Stubing, Josh Fielding, Chris Izzo, Skye Barrett and Jo-Anne Ruscoe at various stages throughout this project.

Executive Summary

The Fisheries Research and Development Corporation's (FRDC) Northern Territory Research Advisory Committee (NT RAC) recognised that a 5-year Research Development and Extension (RD&E) Plan was a major strategic need of the NT but acknowledged that there was limited capacity among sectors to undertake the necessary consultation and compile the required information, to successfully develop such a plan — particularly because of the diversity and geographical separation of various sectors (Indigenous, recreational, commercial wild-catch and aquaculture) and their wide respective stakeholder bases. NT RAC therefore contracted Fishwell Consulting to liaise with each of the sectors to develop separate sector-specific strategic RD&E Plans; and based on these, produce an overarching 5-year RD&E Plan for NT fishery and aquaculture.

The context under which this Strategic RD&E Plan was developed is very much driven by the FRDC — which is a co-funded partnership between its two stakeholders, the Australian Government and the fishing and aquaculture sectors — whose role is to plan and invest in fisheries RD&E activities in Australia. The FRDC 2015-2020 RD&E plan is framed around the National RD&E Strategy, while the FRDC 2015-2020 RD&E Plan guides development, and is itself guided by the FRDC sector-based Industry Partnership Agreement (IPA) RD&E plans and FRDC Research Advisory Committee (RAC) jurisdictional-based RD&E plans. The sector-based and jurisdictional-based plans are also informed by end users. Given this arrangement, development of the NT RD&E Strategy should be guided directly by a combination of the FRDC 2015-2020 RD&E Plan and input from stakeholders, with consideration of the structures of other jurisdictional plans.

Existing plans and strategies were summarised to develop the RD&E framework on which to base this Strategic RD&E Plan. At a high level, there are existing strategic plans that are relevant and influential to setting the Northern Territory's commercial wild-catch and aquaculture research agenda. These include the northern Strategic plans put in place by relevant peak bodies and the Land Councils, NT Fisheries Strategic Plan and associated portfolio plans, the Department of Primary Industry and Resources Industry Development Plan, Success through Innovation – the National Fishing and Aquaculture Research, Development and Extension Strategy 2016, the Northern Territory Fishery Resource Sharing Framework, the 'Our North, Our Future' white paper on developing northern Australia and science strategies put in place by research agencies.

Key stakeholders were identified in the commercial fisheries and aquaculture, Indigenous, recreational and guided fishing tour sectors. These sectors cover a wide geographical distribution, and use a range of equipment to catch and culture a diverse range of species. Representative bodies were engaged via face to face and phone interviews and online surveys. Online surveys were chosen as the main data gathering tool because of the wide spatial extend of NT fisheries. These were distributed and promoted by representative bodies.

Common themes across sectors were identified and formed the basis for a draft overarching RD&E Plan for the NT which was developed in line with a format agreed upon by NT Fisheries and stakeholders. Draft RD&E Plans for each sector were

returned to each stakeholder group (in confidence) for comment. Following this, revisions were made and the final draft document returned for comment prior to broader release.

Across all sectors, the main issues were related to access regarding native title, particularly associated with the Blue Mud Bay decision. In all three plans issues relating to access featured heavily, including developing an understanding of the value each sector places on coastal resources, building awareness of access requirements to and appropriate behaviours on Aboriginal land, the capacity to enforce changed access arrangements and fostering strategic alliances and partnerships between sectors. Many goals, priority areas and outcomes are common across plans for each sector. These outcomes were grouped under the relevant FRDC program (https://www.frdc.com.au/research/rde-planning-and-priorities/frdc-program-areas). Common priority areas for the **Environment** program are *demonstrated resource sustainability* and *fine-scale spatial information on sectoral catches, effort and "values"*. Only priority areas relating to *successful, secure and profitable businesses* (either commercial wild-catch, aquaculture, FTOs or Indigenous) were common across sectors for the **Industry** program, however *equitable cross-sectoral access and allocation arrangements* were common to the commercial wild-catch and aquaculture and recreational sectors, and this priority area has goals relating to developing strategic partnerships with all sectors and a mutual understanding of the value that each sector places on coastal resources. Maintaining a *social licence to operate* is a priority common to the **Communities** program, and this also includes goals relating to developing strategic partnerships with all sectors and a mutual understanding of the value that each sector places on coastal resources. Under this program, both Indigenous and commercial sectors have priority areas that include increasing capacity of *Marine Rangers programs*. The **People** program includes priority areas for *capacity building* and *industry leadership*. Priority areas for **Adoption** are common across sectors.

Keywords:
Research, Development and Extension Plan; Aquaculture; Commercial fishing; Indigenous fishing; Recreational fishing; Stakeholder engagement.

1. Introduction

1.1. Background

The Fisheries Research and Development Corporation (FRDC) is a statutory corporation formed during 1991 under the provisions of the Primary Industries Research and Development Act 1989 (the PIRD Act 1989). The FRDC is a co-funded partnership between its two stakeholders, the Australian Government and the fishing and aquaculture sectors, whose role is to plan and invest in fisheries RD&E activities in Australia. The FRDC's investment in RD&E for fisheries and aquaculture is guided by the FRDC 2015-2020 RD&E Plan 2015–20, which is framed around the National RD&E Strategy, is itself guided by the FRDC sector-based Industry Partnership Agreement (IPA) RD&E plans and FRDC jurisdictional-based Research Advisory Committees (RAC) RD&E plans. The sector-based and jurisdictional-based plans are also informed by end users. Given this arrangement, development of the jurisdictional-based RD&E strategies should be guided directly by a combination of the FRDC 2015-2020 RD&E Plan and input from stakeholders, with consideration of the structures of other jurisdictional plans. The National Fishing and Aquaculture Research, Development and Extension Strategy 2016 shows the relationship between RD&E policies (Figure 1), and describes the need to establish an efficient and effective RD&E system nationally and regionally.

The FRDC's Northern Territory Research Advisory Committee (NT RAC) recognised that a 5-year Research Development and Extension (RD&E) Plan was a major strategic need of the NT but acknowledged that there was limited capacity among sectors to undertake the necessary consultation and compile the required information, to successfully develop such a plan — particularly because of the diversity and geographical separation of various sectors (Indigenous, recreational, commercial wild-catch and aquaculture) and their wide respective stakeholder bases. NT RAC therefore contracted Fishwell Consulting to liaise with each of the sectors to develop separate sector-specific strategic RD&E Plans; and based on these, produce an overarching 5-year RD&E Plan for NT fishery and aquaculture.

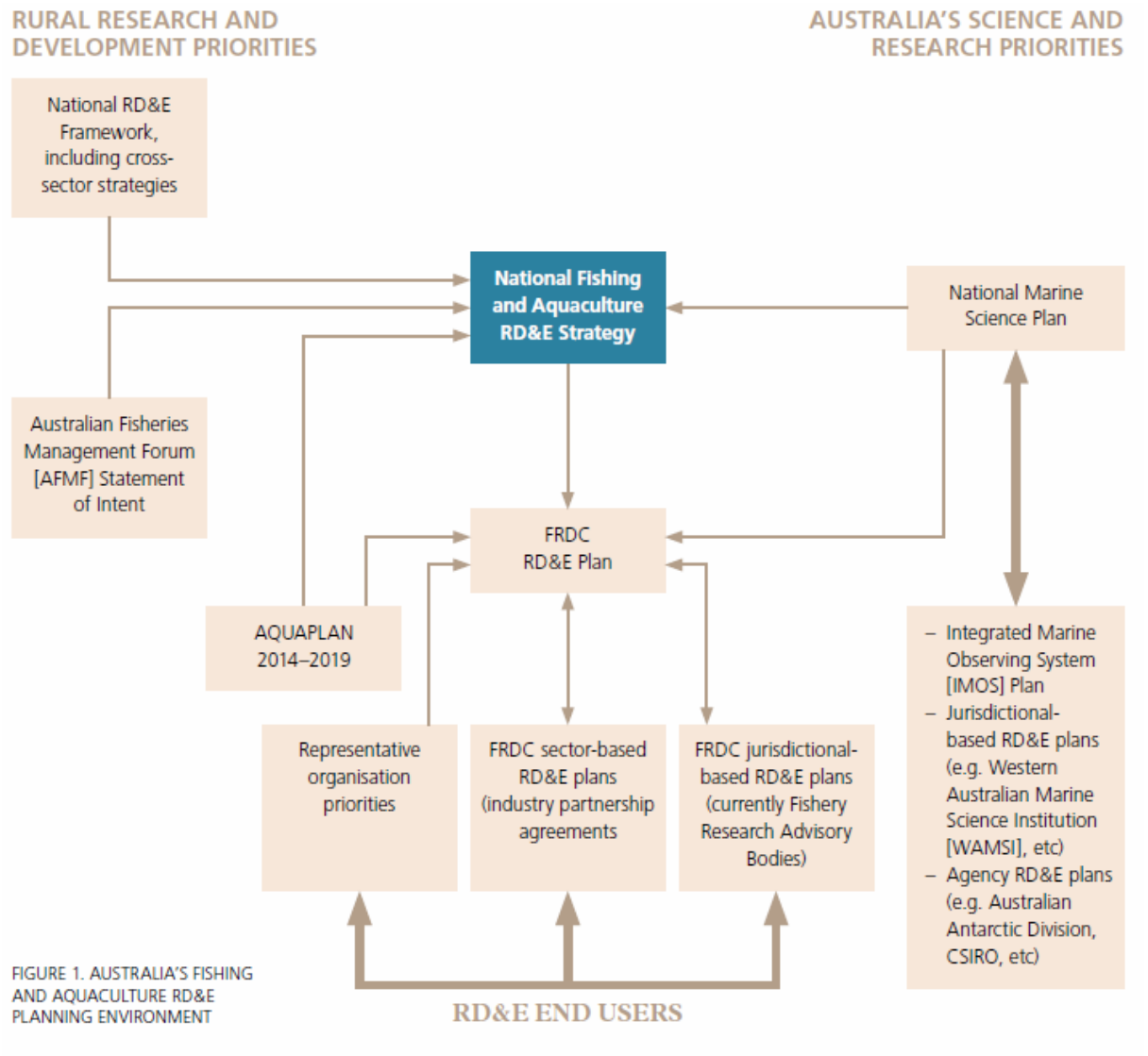


FIGURE 1. AUSTRALIA'S FISHING AND AQUACULTURE RD&E PLANNING ENVIRONMENT

Figure 1. Australia's fishing and aquaculture RD&E planning environment (from Commonwealth of Australia, 2016).

1.2. Overview

At a high level, there are existing strategic plans that are relevant and influential to setting the Northern Territory fisheries research agenda. They include:

- The FRDC 2015-2020 RD&E Plan, the strategic plans of other RACs, subprograms and the Indigenous Reference Group, and those developed under Industry Partnership Agreements;
- The NT Fisheries Strategic Plan and associated portfolio plans (Aquaculture, Indigenous Development, Biosecurity and Aquatic Resource Strategic Plans);
- The Department of Primary Industry and Resources Industry Development Plan;
- Success through Innovation – the National Fishing and Aquaculture Research, Development and Extension Strategy 2016;

- Northern Territory Fishery Resource Sharing Framework (2015)
- The 'Our North, Our Future' white paper on developing northern Australia;
- Strategic plans put in place by relevant peak bodies and the Land Councils to ensure a strong advocacy platform for their constituents (e.g. Amateur Fishermen's Association of the Northern Territory (AFANT,) Northern Territory Seafood Council (NTSC), Northern Land Council (NLC), Tiwi Land Council (TLC), Anindilyakwa Land Council (ALC), Northern Territory Guided Fishing Industry Association (NTGFIA), Environmental Defenders Office Northern Territory (EDONT) and the Australian Marine Conservation Society (AMCS)); and,
- The science strategies put in place by research agencies (e.g. Charles Darwin and other regional universities, Australian Institute of Marine Science (AIMS) and the CSIRO).

1.2.1. FRDC 2015-2020 RD&E Plan

The FRDC 2015-2020 RD&E Plan has five investment programs. RD&E investments across these program areas are assessed to ensure a balanced portfolio that meets the short- and long-term needs of its stakeholders, including the Australian Government and the Australian community. These programs are outlined below.

1.2.1.1. Environment

This program relates to RD&E that supports natural resource sustainability in managing fishing and aquaculture activities in Commonwealth, state and territory waters. Many components of FRDC-funded RD&E focus on improving the sustainable use of Australia's aquatic resources.

1.2.1.2. Industry

This program relates to RD&E that assists the production and value of seafood. It could be in the form of business profitability, international competitiveness, opportunities for productivity increases, resource access, and experience or wellbeing benefits. This program aims to help all sectors improve their overall performance.

1.2.1.3. Communities

This program relates to RD&E that maintains the long-term sustainability of the commercial sector by understanding the interactions and co-dependence between fishing and aquaculture, and the wider community. It is enhanced by knowledge about the social importance of fisheries.

1.2.1.4. People

This program relates to RD&E that is needed to attract and advance people who will lead fishing and aquaculture towards a sustainable and profitable future. The FRDC has taken a strong role in this area, from employing and developing young researchers, through to facilitating access to leadership development for all sectors of fishing and aquaculture.

1.2.1.5. Adoption

This program relates to how project outputs are delivered so they can be easily adopted and support stakeholder decision making and practices. The FRDC continually works with researchers and end users to determine and implement the best way of extending these results. In addition, the FRDC is continuing to develop its systems to ensure its 'knowledge bank' is widely accessible.

Under the RD&E Plan, the FRDC provides greater ownership and authority to industry sectors in developing RD&E priorities, through a network of Research Advisory Committees (RACs) located in each jurisdiction and Industry Partnership Agreements (IPAs).

A key component of this investment model is the development of a multi-year RD&E Plan for each IPA and RAC aligned with the FRDC's 5-year RD&E Plan. This assists in developing a tailored RD&E program that:

- meets both jurisdictional and national strategic RD&E priorities;
- is balanced across FRDC programs (environment, industry, communities, people and extension);
- focusses on short, medium- and longer-term RD&E outcomes; and,
- is supported by a consistent RD&E planning framework across all RACs.

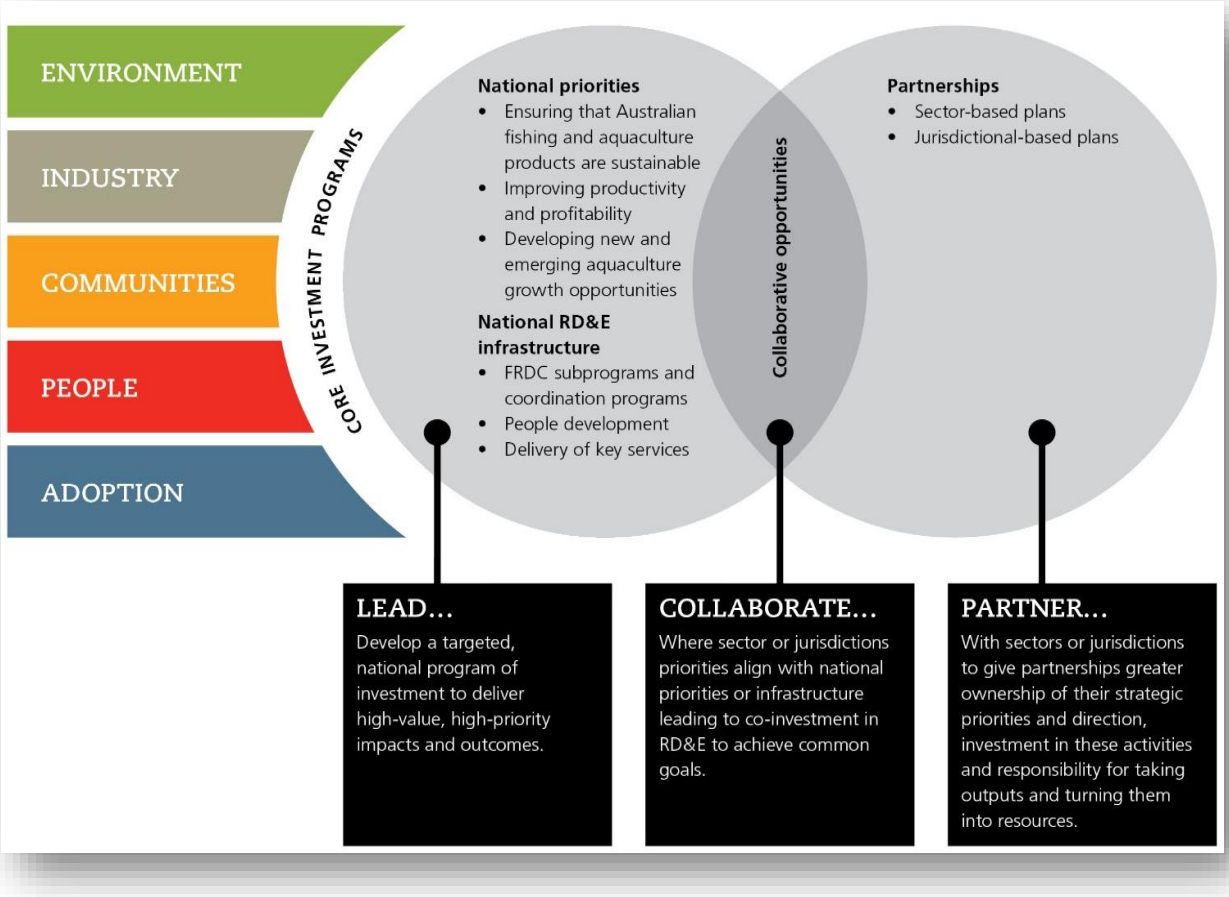


Figure 2. The framework for RD&E investment by the FRDC for 2015-2020

1.2.2. NT RAC

The RACs have an important role in maximising the efficiency of the FRDC's planning and funding process. The NT RAC works on behalf of a diverse set of stakeholders that includes: Indigenous communities; commercial fisheries and aquaculture; seafood management sectors; recreational and tourism fishing, as well as the northern Territory Government; the FRDC Board; various FRDC partner groups; and the wider research community.

The Terms of Reference of the NT RAC establish the broad framework of operation for the group. The NT RAC recognises that its stakeholders include the commercial seafood industry, Aboriginal communities, the recreational and fishing tourism sector and Northern Territory Government and the broader community. Committee members of the NT RAC are selected based on expertise, ensuring wide stakeholder representation. Specific to effective service to these stakeholders, the NT RAC regards the following as important operational drivers against which their performance should be measured:

- Balanced investment portfolio;
- Investment in novel and innovative opportunities;
- Collaboration with other partner groups and research initiatives;
- Capacity building;
- Responsiveness to need; and,
- Direct adoption and implementation of research outcomes thus driving change

The IPAs associated with NT RAC include: Australian Barramundi Farmers' Association IPA; Australian Prawn Farmers' Association IPA and Pearl Consortium IPA. Each of their RD&E priorities is outlined below.

1.2.3. Industry Partnership Agreements (IPAs)

1.2.3.1. Australian Barramundi Farmers' Association (ABFA)

ABFA sees its four critical investment areas as:

1. Differentiation of product by naming, branding and certification;
2. Consistent high quality through a quality assurance scheme
3. Effective regulatory framework;
4. Management of biosecurity risk.

Their current research priorities are:

- Assessing the nutritional value of Australian Barramundi (project underway);
- Real time monitoring of water quality and mechanisation of pond management to boost productivity and increase profit (project underway);
- Improve the quality and consistency of farmed Barramundi in the market place to improve sales, volume, market share and revenue;
- Improve harvest and slaughter methods to improve fish welfare and or quality for the market place;
- Identify value-adding opportunities for Australian farmed Barramundi;
- Optimise treatment of parasites to increase productivity and profitability; and,
- Improved understanding of juvenile Barramundi gut health.

1.2.3.2. Australian Prawn Farmers' Association (APFA)

The APFA 5-Year R&D Strategic Priorities 2015-2019 lists the follow high priority areas in order:

1. Genetics and post-larvae
   • increasing post larval quality and health, and consistent hatchery output. Domestication remains a high priority research area;
2. Farm Efficiency
   • energy efficient technology, automation and increasing aeration efficiencies;
3. Nutrition
   • notably 'fish meal reduction' and 'feeding efficiency'; and,
4. Disease & Biosecurity
   • preventing exotic viruses and diseases, and viral clearance and mitigation

Other areas of strategic R&DE include: Social License, Staff & Training, Marketing, Farm Profit, Waste Management, Value Adding, APFA Communications and Regulations. Disease & Biosecurity and Genetics & PL's are also in the top 5 for Strategic Issues & Risks.

1.2.3.3. Pearl Consortium IPA.

The Pearl Consortium IPA was established in 2011 and extends until 2021, representing eight pearling companies that have co-invested directly with FRDC to improve existing production technology and develop new technologies. Their current priority investment areas include:

- Greater understanding of technical, biological, husbandry and environmental factors affecting pearl production and quality;
- Improved pearl quality from superior hatchery produced stocks;
- Reliable spat production methods that deliver high quality pearl oysters for seeding operations;
- Reduction in the production cost per oyster from hatchery to seeding operations
- More efficient farm husbandry methods that minimise WH&S risks; and,
- Greater knowledge of pearl oyster health issues and how they interact with production methods.

1.2.4. NTSC Strategic Plan (2018-2023)

The peak industry body for NT commercial aquaculture and wild-catch fisheries is the NTSC. The Council is an incorporated association that represent the NT seafood industry's interests in a diverse range of forums in the NT and at a national level. The NTSC has a Board of Directors that is comprised of a Chairman, Vice Chairman, Secretary, Treasurer, a CEO and a representative of each of the Licensee Committees: Aquaculture, non-pearl; Aquaculture, pearl; Aquarium Fishery; Barramundi Fishery; Coastal Line Fishery; Coastal Net Fishery; Demersal Fishery; Mud Crab Fishery; Offshore Net and Line Fishery; Spanish Mackerel Fishery; Trader/Processor Sector; Timor Reef; and, Trepang Fishery. All commercial seafood industry Licence holders are eligible for full NTSC membership.

The NTSC's vision is that the "Northern Territory seafood industry is a trusted, stable and prosperous industry which is continually earning its social licence to operate". Their objectives are:

- To promote, encourage and assist the Northern Territory's commercial seafood industry and persons and groups involved in it;
- To promote, engage in, encourage and assist research, conservation and other activities beneficial to the interests, persons and groups of the Northern Territory commercial seafood industry generally; and,
- The promotion of the development of the Northern Territory's fishing and aquaculture resources.

The NTSC has developed a strategic plan in order to meet these objectives and ultimately achieve their vision. This Plan recognises that "future proofing" the NT commercial fisheries is a key strategic requirement and has focussed on three key pillars to build its "social licence to operate":

1. Improving structures for an effective NT Seafood Council
   • Improve NTSC Board governance and capacity in agreement making and sharing control with members so that the NTSC acts as a collective in addressing the longer term, complex risks for the organisation;
2. Building trust in our industry between our members, community and government
   • Improve stakeholder communication and engagement and in particular, involve Aboriginal communities in the fisheries and to deliver regionally dispersed economic benefits; and,
3. Demonstrating sustainability
   • Lead innovative projects to demonstrate that sustainability challenges can be resolved in a way that secures fishing grounds through better understanding of supply chains and the investment points needed to improve fish quality and supply.

Although the first of these pillars does not necessarily require an RD&E component, the second two can definitely benefit from RD&E, particularly the extension component. With regard to the extension, the NTSC Strategic Plan highlights the diverse range of stakeholders with whom they need to engage, including: the seafood and restaurants industry, NT Government, Indigenous sector, NGOs, Recreational fishers, research associations, the broader NT community and the Australian Government.

1.2.5. AFANT Strategic Plan 2013

AFANT is recognised by the NT Government as the peak body representing recreational and sport fishing in the NT. Their overriding objective is to ensure that the NT's world-class recreational fishery is nurtured and protected for current and future generations of Territorians and visiting fishers. AFANT represented the interests of the recreational fishing sector on many committees dealing with fisheries and natural resource management in the NT. They have a wide membership base, including about 15 registered fishing clubs around the NT that are Club Affiliate and Association Members (Groote Eylandt Game and Sportfishing Club, Darwin Game Fishing Club, Darwin FlyRodders, Nhulunbuy Regional Sports Fishing Club, Katherine Game Fishing Club, Palmerston Game Fishing Club, Wagait Beach Fishing Club, RAAF

Darwin Fishing Club, RAAF Tindal Fishing Club, King Ash Bay Fishing Club, Dundee Social & Recreation Club, NT Dolphins Spearfishing Club, Alligator Fishing Club Inc. and Darwin Trailer Boat Club).

The AFANT Strategic Plan (2013) was developed with consideration of the then current AFANT operations and activities, previous AFANT development plans, AFANT's core business, NT Government's Recreational Fishing Development Plan 2012-2022 and all potential threats to angling in the NT. The Strategic Plan is focused on nine key strategic areas:

1. Represent and advocate the interest of recreational fishing

• Engage with all clubs to understand the views and issues of the wider membership base and show strong representation of those views and issues through engagement with governments and other groups including traditional land owners, while fostering capacity development of young recreational fishers and promoting AFANT's work to the recreational fishing community;

2. Protect and enhance the quality of the NT fishing experiences

• Ensure appropriate access to fisheries resources, advocate for the sustainability of fish stocks and the quality of recreational fishing experiences and boating infrastructure, and promote the benefits and importance of recreational fishing;

3. Provide representation and advice to governments

• Participate in all government committees and working groups that can impact on recreational fishing in the NT, provide election priority and policy advice to political parties and candidates, and maintain working relationships with key politicians, public servants and industry group figures;

4. Maintain and where possible improve recreational fishing access

• Monitor access issues, land use change and other development proposals that may impact on recreational fishing, support the artificial reef program, and foster a relationship with Traditional Owners to gain access to fishing grounds and maintain that access by educating recreational fishers on appropriate respectful behaviours on designated sacred or culturally significant sites and owned land;

5. Promote ethical, sustainable, safe and legal fishing practices

• Review recreational fishing regulations and support and advocate changes to regulations to maintain fisheries sustainability, and promote ethical, legal and humane fishing practices including the Recreational Fishing Code of Practice;

6. Participate in the management of recreational and other fisheries

• Represent recreational fishers on fisheries management advisory committees and other fishery related groups and identify fisheries management needs as they emerge;

7. Liaise constructively with other fishing sectors on matters of mutual interest

• Work with the NTSC and the NTGFIA on issues of mutual concern or benefit and foster a relationship with the NT Cattlemen's Association and pastoralists and the NT Environment Centre;

8. Support and participate in fisheries research

• Lobby government for resources to monitoring fisheries including recreational fishing surveys, participate in decision making on NT fisheries research including on the NT RAC and support the tagging and angler diary programs; and,

9. Promote the protection of the environment related to recreational fishing

• Review environmental assessment processes and ensure representation and negation of the effects of environmental degradation on recreational fishing, and educate recreational fishers on practices to reduce the risk of spreading weeds and introduced pests.

Some of these key strategic areas do not necessarily require an RD&E component, but many can benefit from RD&E, particularly in capacity building, sustainability of target species and data collection, resource allocation and access, demonstrating benefits of recreational fishing (socially and economically) and education.

1.2.6. NTGFA

Fishing Tour Operators (FTOs) are represented by the NTGFA. NTGFA's objectives are to:

1. Promote, develop and maintain the Guided Fishing Industry in the Northern Territory;
2. Assist the Northern Territory Government in managing the Guided Fishing Industry to ensure and enhance its economic viability and the sustainability of its target species; and,
3. Take a proactive role in maintaining the quality of marine and freshwater fish habitats and of the environment generally.

1.2.7. ALC 15-year Strategic Plan

The ALC represents the Traditional Owners of the communities from Angurugu and Umbakumba on Groote Eylandt, Milyakburra on Bickerton Island and a number of outstations. The ALC's mission is to protect, maintain and promote Anindilyakwa culture, invest in the present to build a self-sufficient future and to create pathways for youth to stand in both worlds.

The ALC 15-year Strategic Plan (2012) was developed after consultation with the two moieties that are comprised of 14 clan groups. ALC's Strategic Plan is focused on 6 key goals:

1. Protect the land and sea

   • The ALC aims to hold environmental accountabilities in mining leases through expansion of the Land and Sea. To inform decision meeting by Traditional Owners, the plan describes anthropological, archaeological and environmental studies that need to be undertaken. The plan outlines other measures to protect sea country and to seek potential linkages with the environment and economic opportunities in a post-mining era. This goal has a number of actions relating for developing fishing and aquaculture businesses;

2. Develop best-practice service delivery

• this goal addresses significant issues regarding health, education and essential services. Specifically targeted areas include education, health, aged care services, municipal services, housing, transport and food;

3. Develop a living cultural economy
   • this goal proposes establishment of Cultural Enterprise Centres to be used by all community members. The Centres are to provide culture-based programs for community members from early years through to employment. This included improving school attendance, enrolment welfare reform measures, strengthening the language, mapping Anindilyakwa art sites and training and employment pathways for youth, while also supporting development of fishing and aquaculture ventures;
4. Strengthen Community Capacity
   • improving the lives of community members through addressing substance abuse and community safety concerns, as well as developing leaders to take ownership of services in the future;
5. Working with all partners
   • this goal outlines relevant partners including all local Indigenous organisations, businesses, Australian, Territory and local government agencies, and non-government organisations, and the continuation of the Regional Partnership Agreement into RPA Stage 3. The importance of continuing to work with the Groote Eylandt Aboriginal Trust (GEAT) and for increasing local capacity to run local services;
6. Move towards an Anindilyakwa Regional Authority
   • The ALC currently undertakes roles outside of the legislation that formed it, and the proposed Anindilyakwa Regional Authority some of those roles currently undertaken by the ACL including delivery of core health services, establishment of independent schools delivering bilingual education and pathways from early childhood through to full employment and contract services to Anindilyakwa-owned business providers.

1.2.8. NLC Strategic Plan 2016–2020

The Northern Land Council (NLC) represents Traditional Owners in the Top End of the Northern Territory. Under the *Aboriginal Land Rights Act 1976, the NLC has a number of statutory obligations including (but not limited to):*

- *to* ascertain and express the wishes of Aboriginal peoples about the management of their land and legislation about their land;
- to consult Traditional Owners and other Aboriginal peoples interested in Aboriginal land and land under claim;
- to assist Aboriginal peoples to carry out commercial activities; and
- to protect the interests of Traditional Owners of, and other Aboriginal people interested in, Aboriginal land

The Strategic Plan 2016–2020 outline their key strategic issues, goals, strategies and actions. Their goals are listed below:

- Strengthen internal and council governance processes to meet strategic organisational objectives and mandates, and achieve the Vision and Mission
- Strengthen the NLC's advocacy and negotiating capability through partnerships and relationships, and ensure resources are tied to these areas in order to provide support to claimants and Traditional Owners;
- Facilitate regional economic development planning through a 'Prospectus for Indigenous Development';
- Develop strategic succession planning within management and in the regions by identifying youth and helping them develop into governance and leadership roles;
- Extend and maintain consistent and effective communications programs and systems;
- Secure funding for non-core activities;
- Mediate and resolve disputes;
- Implement a regionalisation strategy with appropriate investment;
- Implement a long term strategy to grow the Ranger and Caring for Country programs;
- Strengthen the engagement of women in the business of NLC;
- Maintain good relationships with government and shires.

1.2.9. Success through Innovation – the National Fishing and Aquaculture RD&E Strategy 2016;

This Strategy sets out a plan for how the RD&E that supports Australian fishing and aquaculture can become more focused, efficient and effective over the next five years. The national RD&E priority areas identified in this Strategy are:

- Australia's fisheries and aquaculture sectors are well managed, and acknowledged to be ecologically sustainable;
- Security of access to, and allocation of fisheries and aquaculture resources is improved;
- Benefits and value from fisheries and aquaculture resources (productivity and profitability) are maximised, and aquaculture production increased;
- Governance and regulatory systems are streamlined;
- Health of the habitats and environments on which fisheries and aquaculture rely are maintained; and,
- Aquatic animal health management is improved.

1.2.10. NT Department of Primary Industry and Resources Strategic Plan (2018–2022)

The Vision of this plan is that "The Northern Territory's primary industries and resources drive economic growth". To achieve this vision, they aim to:

- support Aboriginal and regionally-based business to provide economic and employment opportunities;
- ensure the Northern Territory optimises benefits from its agriculture, fisheries, minerals and energy sectors; and,

- capitalise on opportunities arising through the Developing Northern Australia agenda to achieve real results for the Northern Territory.

It has the following Goals:

- Promote and facilitate the development of our primary industries and resources;
- Collaborate and strengthen relationships with our stakeholders and the community;
- Use regulation of our industries and resources as a foundation for appropriate economic development;
- Support our people to be productive while feeling valued, respected, supported and safe; and,
- Build capability, adopt contemporary technology and improve service delivery.

2. Objectives

1. Hold workshops and conduct surveys to determine sector priority RD&E areas.
2. Deliver a 5-year RD&E Plan to NTRAC that includes input from stakeholders.
3. Develop Strategic R&D Plans for each of: commercial, recreational, Indigenous and aquaculture sectors.
4. Leave each stakeholder group with the tools and a process to conduct repeatable surveys of their membership's RD&E needs so that priorities and strategic plans can be updated and fed into the 5-year NT Strategic Plan.

3. Methods

3.1. Defining the RD&E framework

The report titled Success through innovation: The National Fishing and Aquaculture Research, Development and Extension Strategy 2016 (Commonwealth of Australia, 2016) set out a clear hierarchy of RD&E policy documents (Figure 1), guided by four other policy documents: the National Primary Industries RD&E Framework (NPIRDEF, 2017); the Australian Fisheries Management Forum (AFMF) Statement of Intent (AFMF, 2017); the National Marine Science Plan (Gunn, 2015); and AQUAPLAN 2014–2019 (Department of Agriculture, 2014). The National Fishing and Aquaculture Research, Development and Extension Strategy 2016 guides the FRDC 2015-2020 RD&E Plan, which also draws further from the National Marine Science Plan, AQUAPLAN 2014–2019, as well as from representative organisation priorities. The FRDC 2015-2020 RD&E Plan guides development, and is itself guided by the FRDC sector-based RD&E pans and FRDC jurisdictional-based RD&E plans. The sector-based and jurisdictional-based plans are also informed by end users. Given this arrangement, development of the NT RD&E Strategy should be guided directly by a combination of the FRDC 2015-2020 RD&E Plan and input from stakeholders, with consideration of the structures of other jurisdictional plans. This was the approach adopted for the current project.

Guidelines for setting jurisdictional and industry sector research priorities are provided in the FRDC 2015-2020 RD&E Plan. Priority setting processes are to be consistent with the requirement that the FRDC maintain a balanced portfolio, and be agreed to by the FRDC board. A balanced portfolio includes consideration of national research priorities, as well as a balance of short- and long-term projects, low and high risk projects, strategic and adaptive research needs, regional variations as needed and national, jurisdictional and sector-focused projects (FRDC, 2015).

Addressing the three national priority areas, the FRDC (2015) has listed eight targets to be completed during the life of the RD&E plan. In developing the NT RD&E plan, consideration was given to those targets.

3.2. Stakeholder engagement

While it is efficient to engage with representative bodies, it was necessary to get input from individuals represented by those bodies. NT fishery stakeholders are numerous and distributed over a wide spatial extent, making it difficult to capture their input in face to face meeting. With input from representative bodies and NT RAC, developed online surveys that were customised to each sector and distributed by representative bodies. Surveys were structured to obtain information about issues and research priorities structured around the FRDC's programs and priority areas.

Preliminary results were be presented at meetings with key groups including: the NTSC, AFANT, NTGFIA, scientists and managers from the Department of Primary Industry and Resources working with various sectors. Face-to-face meetings and/or telephone meetings were held with members of other key groups such as the Nhulunbuy Regional Sports Fishing Club and the King Ash Bay Fishing Club, the three land councils (Northern Land Council, Anindilyakwa Land Council and Tiwi Land Council and NAILSMA; Department of Primary Industry and Resources; and, Environment Groups and other stakeholders who are represented on the RAC.

A list of face to face meetings to discuss the survey design and or results is shown in Table 1.

Table 1. List of face to face meetings with stakeholders during project.

Date	Name	Group	Location	Relevant Sector
25 October 2017	Natasha Stacey and Rik Buckworth	NT RAC	Darwin	NT RAC
25 October 2017	David Ciaravolo	AFANT	Darwin	Recreational
30 April 2018	Ricky Archer and Glenn James	NAILSMA	Darwin	Indigenous
1 May 2018	Will Bowman	DPIR	Darwin	Aquaculture / Commercial
2 May 2018	Mark Grubert	DPIR	Darwin	Commercial
2 May 2018	Evan Needham	DPIR	Darwin	Recreational
2 May 2018	Matthew Osborne	DPIR	Darwin	Indigenous
2 May 2018	Shane Penny	DPIR	Darwin	Commercial
2 May 2018	Phil Hall	DPIR	Darwin	FTO
3 May 2018	Luke Playford	Dhimurru Aboriginal Corporation	Gove	Indigenous
3 May 2018	Terry Yumbulul		Gove	Indigenous

3 May 2018	Dennis Sten	NTGFA	Darwin	FTO
4 May 2018	David Ciaravolo	AFANT	Darwin	Recreational
26 September 2018	Members of the King Ash Bay Fishing Club	King Ash Bay Fishing Club	King Ash Bay Fishing Club	Recreational
27 September 2018	David Ciaravolo and board members	AFANT	Darwin	Recreational
20 March 2019	David Ciaravolo	AFANT	Darwin	Recreational
21 March 2019	Matthew Osborne	DPIR	Darwin	Indigenous
21 March 2019	Dennis Sten	NTGFA	Darwin	FTO

3.3. Leaving a legacy

Due to prohibitive costs, dispersed and remote members and communities, and limited stakeholder capacity and human resources, the ability for the peak bodies of each sector to engage in RD&E priority setting process is variable and has been inconsistent over time. As such, apart from facilitating input into the current plan, the additional aim of this project was to leave a legacy whereby each recreational and commercial and aquaculture sectors have a framework to obtain feedback from their membership to improve and expand their individual plans over time to feed into the Territory multi-sector plan. The NTSC and AFANT were provided with their own customised survey that can collect quantitative information from their executive / membership to use as an ongoing tool to collect information on RD&E priorities. A similar survey was made for the Indigenous sectors, but this was less successful than face-to-face meetings. These surveys are freely available to the sectors to keep informed of member priorities and feed into updated 5-year NT Strategic Plans in the future.

4. Results

4.1. Overview of Northern Territory Fisheries and Aquaculture

4.1.1. Indigenous fisheries

The relationship between Aboriginal people and the NT coastline dates back more than 50,000 years. Their historic cultural and spiritual connection to Land and Sea Country is recognised under the NT Fisheries Act as is their right to continue traditional fishing practices which includes customary, commercial, aquacultural and recreational activities that incorporates management.

Many marine and freshwater species are totemic for NT coastal Aboriginal groups who continue to practise customary management and education relating to the sea that has been passed on through generations in stories, dance, song, art and ceremony. Fishing by Traditional Owners in the Northern Territory mostly takes place in inshore coastal waters, rivers and freshwater water bodies, with about two thirds of all fishing being in saltwater.

Most Traditional cultural fishing takes place using baited line methods, hand collection, spears and cast nets, and vast majority of fishing is done from the shore (as opposed to by boat, although many Indigenous people own and fish from vessels). Most popular catch by number is molluscs (mostly mussels and other bivalves), finfish (mostly mullet and catfish) and crabs and lobster (mostly mud crabs)[1]. Traditional cultural fishing remains an important part of daily life in the Northern Territory but contemporary involvement of Indigenous people in NT fisheries is not just restricted to traditional fishing, it encompasses commercial wild-catch, commercial aquaculture and recreational fishing sectors.

While there is no single Indigenous entity overseeing Indigenous fishing and fisheries, there are four regional Land Councils in the Northern Territory: the Northern Land Council (NLC) covering the Top End; the Anindilyakwa Land Council (ALC) covering Groote Eylandt in the Gulf of Carpentaria; the Tiwi Land Council (TLC) covering Bathurst and Melville Islands; and, the Central Land Council (CLC) in the southern half of the Northern Territory. The first three are heavily involved in Sea Country rights and the management of Sea Country. The Central Land Council is more involved in Freshwater Country. As mentioned previously, separate from the Land Councils, the North Australian Indigenous Land and Sea Management Alliance Ltd (NAILSMA) assists Indigenous Land and sea managers and Traditional Owners across northern Australia to engage in the market economy and to value and strengthen their own cultural values, beliefs and practices.

Indigenous people are involved in a number of NT commercial fishing license ventures either directly or indirectly through their communities. In the near future, it is likely that there will be a greater involvement of Indigenous people in commercial fishing following financial support provided by the Commonwealth government through the NLC to support Aboriginal participation in the seafood industry. The NT Government is also exploring complimentary support and grant programs to assist Traditional Owner involvement in the seafood industry.

Whilst not strictly commercial licences under NT legislation, Aboriginal Coastal licences (ACLs) are available to Aboriginal people living full time in Aboriginal communities to provide a “start-up” opportunity for economic development and sustainable commercial activities in coastal Aboriginal communities. An ACL allows the licence holder to catch fish near their community. Catches of up to 5t per year may be sold but important commercial species such as Barramundi, King Threadfin Salmon, Spanish Mackerel, Trepang and Mud Crab may not be targeted. Allowable fishing gears include: up to 100 m of net with mesh size up to 65 mm; hand spear, scoop net; vertical line as handline or rod and real; and a traditional fish trap. Licence holders must submit a monthly log sheet detailing what and how many fish were caught and how much was sold, and must not fish in reef protection zones, set nets across rivers or fish in sacred sites. The ACL is viewed as a potential pathway for Indigenous individuals/communities stepping into the ownership and operation of full commercial fishing licences.

[1] Henry, GW and Lyle, JM. (2003). The National Recreational and Indigenous Fishing survey. NSW Fisheries Final Report Series No. 48. FRDC Project No. 99/158.

Aboriginal aquaculture development is being supported through research projects focusing on low technology, sea-based methods and involving several communities across the NT. The Darwin Aquaculture Centre (DAC) and its partner organisations have worked together with the Warruwi community on South Goulburn Island and the Pirlangimpi community on the Tiwi Islands to conduct black-lipped Rock Oyster trials. This has involved establishing small scale oyster farming systems (long lines) to provide community members with experience in culturing oysters. Local people maintain the oyster production trials and monitoring water quality, growth and survival of farmed oysters. There has been considerable interest from communities across the NT to participate in this research and eventually establish their own oyster farms.

Another significant and expanding area of involvement of Indigenous people in NT fisheries is through the 16 Marine/Sea Ranger groups supported by the various Land Councils of which half also receive funding from the NT Fisheries Division. These Sea Ranger Programs assist with local monitoring and surveillance of coastal waters but are playing an increasing role in extension and education to both Indigenous and non-Indigenous Fishers, as well as providing a visual presence on the water.

4.1.1. Recreational fisheries

Recreational fishing is an intrinsic part of the NT lifestyle with more boat ownership per capita than other parts of Australia. Fishing is a strong tourism draw card and a valuable economic contributor to our economy. Staying attractive as a tourism destination means protecting the Northern Territory's wilderness fishing and high-quality sports species branding. Annual expenditure by recreational fishers and the guided fishing industry is estimated at over $100 million.

Recreational fishing is generally categorised as "barramundi fishing" and "blue water fishing", with the latter further divided into reef-fishing, pelagic fishing, game fishing for trophy fish, and sports fishing with lures, soft plastics and flies. "Mud-crabbing" is also a favourite pastime of many recreational fishers. Most recreational fishing effort occurs in coastal areas, and almost one third occurs in and around Darwin Harbour. An estimated 30,538 non-Indigenous NT residents fished in the NT during April 2009–March 2010, undertaking about 150,000 fishing days, while an estimated 135,000 fishing events were undertaken by interstate fishers in the NT in 1999–2000. Results of National Visitors Surveys and International Visitors Survey revealed that more than 120,000 fishing visitors to the NT in the year ending 2014, including about 20,000 international and 40,000 interstate visitors[2]. A wide range of fishing methods are used in the NT including line fishing, traps / pots, cast nets and diving. The main species caught by recreational fishers during 2009–2010 (by number) were small baitfish, Barramundi, Mullet and Mud Crab (Figure 3), but Barramundi is the iconic species that draws most visitors to fishing in the NT.

[2] Fishing Segment Profile - Tourism NT. Tourism NT, Northern Territory Government.

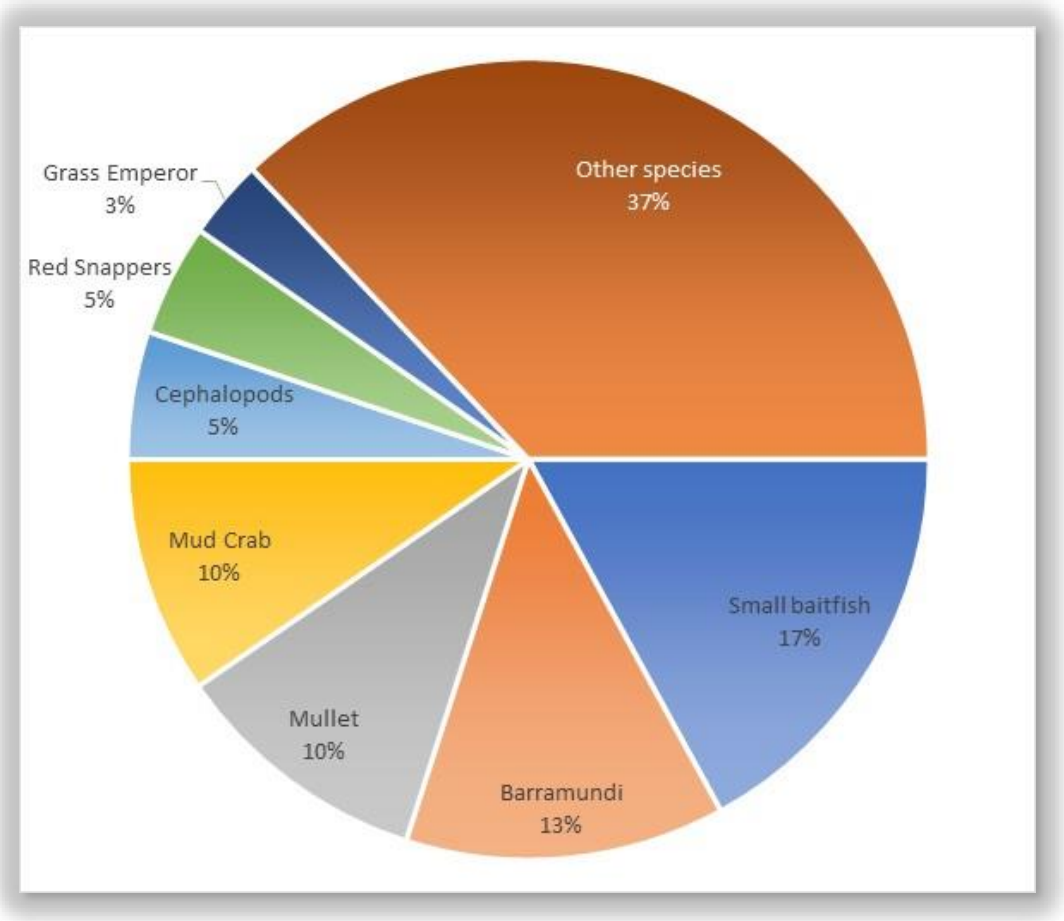


Figure 3. Retained recreational catch composition (by number in 2009–10 (modified from West *et al,* 2012[3], accessed on 7/11/2018 https://dpir.nt.gov.au/__data/assets/pdf_file/0016/233017/fr109.pdf).

FTOs are an important component of fishery tourism running guided tours and boat hire businesses. There are 134 FTO licences in the NT, held by 91 licencees, although about half of those licences are inactive. While FTOs require a licence to operate, their customers are subject to recreational fishing regulations. Nearly 84,000 line hours of fishing effort was recorded by FTOs in 2011, of which about 95% was casting or trolling artificial lures, and 5% live baiting. FTO clients caught 63,859 Barramundi in 2011, of which 91% were released.

Monitoring of recreational fishing is undertaken using a diary angler and tag and release programs, while surveys to estimate the recreational catch, effort and economic contribution are undertaken periodically. FTOs operate under a licence, and also require an approved operator card demonstrating they are a fit and proper person to hold an authorisation. FTOs have to complete a logbook to report catch, effort and location of fishing to the Fisheries Department.

[3] West, L.D., Lyle, J.M., Matthews, S.R., Stark, K.E. and Steffe, A.S. (2012). Survey of Recreational Fishing in the Northern Territory, 2009-10. Northern Territory Government, Australia. Fishery Report No. 109.

4.1.2. Commercial wild catch fisheries and aquaculture

The tropical waters of the Northern Territory are home to a wide variety of socially and economically[4] important wild-catch fisheries and aquaculture operations. The NT seafood industry has more than 200 commercial fishing licences and 190 registered fishing vessels operating in 1 different wild catch fisheries and aquaculture operations. Commercial fishing ventures typically supply relatively low volumes of high value seafood product (comprised of mackerel, Goldband Snapper, Mud Crabs, Barramundi and numerous tropical species of snapper) to local, national and international markets and restaurants. Six species account for 50% of the total value of the wild-catch fisheries. The economic significance of the seafood industry is greater than just the landed value of the catch — professional fishing operations, such as seafood wholesalers, processors, and retailers, all contribute millions of dollars annually to the Northern Territory's economy.

Aquaculture continues to grow as an important industry in the NT. In particular, pearl culture makes a substantial social and economic contribution to the NT. Similarly, Barramundi culture has also been successful with production continuing to increase. Furthermore, there are proposals to significantly expand prawn aquaculture in the Northern Territory. In the relatively pristine coastal waters of the NT, the potential of introduced disease to impact aquaculture (and wild-capture fisheries) is seen as a considerable risk. Aquatic animal health remains a challenge, particularly for intensive aquaculture, with disease outbreaks continuing to be a major risk for well-established and developing aquaculture businesses and there is a need for further research on disease diagnostic capability, surveillance and treatment.

New and innovative aquaculture projects have recently developed in partnership with local companies and remote Aboriginal communities. Advances in culture methods for Sea Cucumbers, Giant Clams and Tropical Rock Oysters have been encouraging, with pilot studies underway at Groote Eylandt, Goulburn Island, and the Tiwi Islands.

Our commercial fisheries and aquaculture often operate in remote tropical areas where they are challenged by a lack of infrastructure, access to only basic services and difficulties obtaining skilled labour, all of which can limit potential without direct planning. Further, the distance from major markets can put upward pressure on living

[4] http://www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-data#australian-fisheries-and-aquaculture-statistics-2016

and business costs, and regulatory overburden and investment certainty are persistently stated points of concern for the seafood industry.

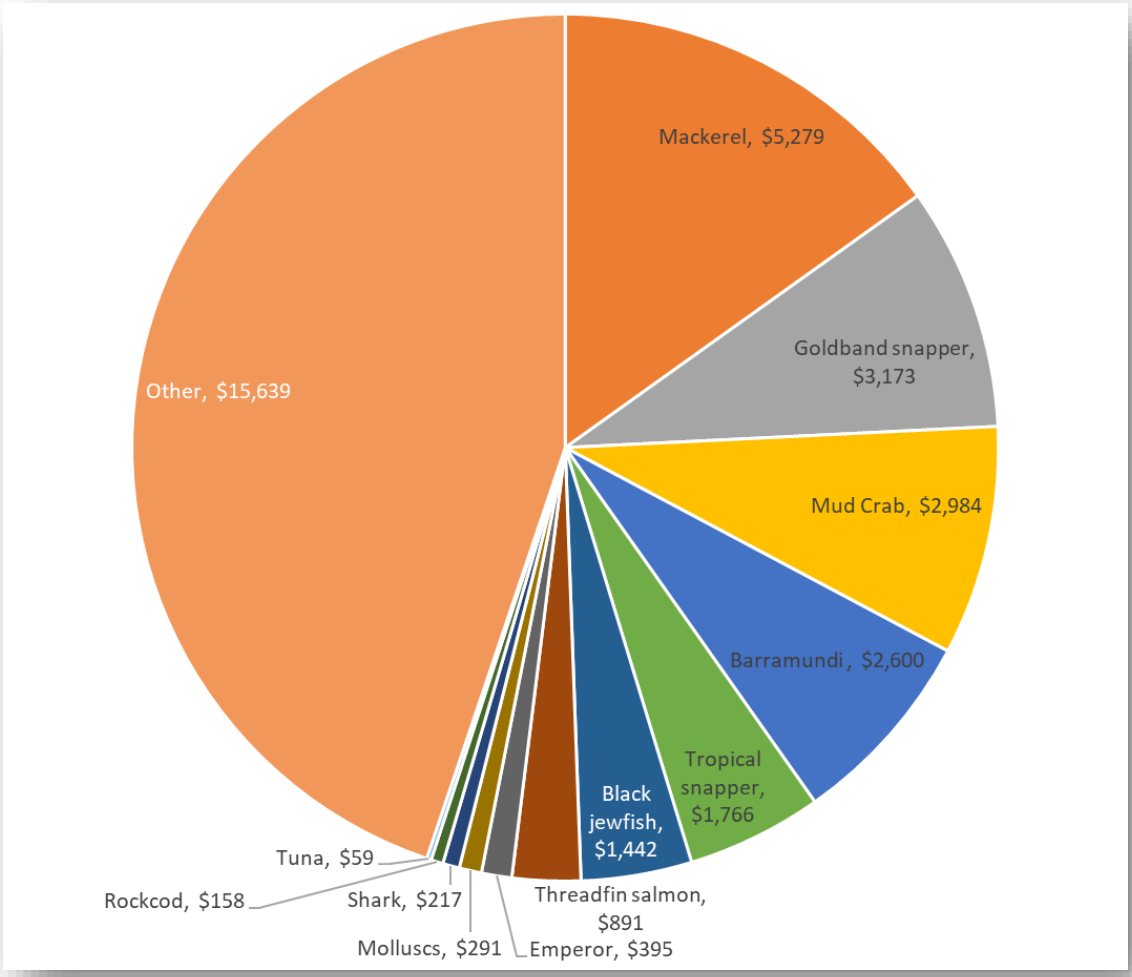


Figure 4. Value ($'000) of NT commercial fisheries and aquaculture (modified from ABARES 2017, Australian Fisheries and Aquaculture Statistics 2016 - Production, accessed on 20/06/2018.

4.1.2.1. Commercial wild-catch

There are 17 types of commercial fishing/aquaculture licences operating in the Northern Territory (Fishing Tour Operators are considered under the Recreational RD&E Plan). All commercial fishing activities in the Northern Territory are regulated under the Northern Territory Fisheries Act, which was updated in 2016. Like most contemporary fisheries legislation, the NT Fisheries Act sets out objectives tied to sustainability, equity and optimal resource use from the perspective of maximising benefits to the NT community at large. Research, development and extension activities that are driven by sustainability and that illuminate the social and economic components of equitable and optimal use are critical to our current and future prosperity.

The following brief descriptions of each fishery were obtained from https://nt.gov.au/marine/commercial-fishing, accessed on 20/06/2018.

4.1.2.1.1. Aboriginal coastal

These licences can be owned by an Aboriginal person living full time in an Aboriginal community with the agreement and support of their community. They entitle the holder to catch and sell fish to most people, such as community members, visitors, community shops or fish wholesalers. They are allowed to use hand spear, scoop nets, handlines, rod and reel and up to 100 m of net, with mesh size up to 65 mm. They also are licenced to use a traditional fish trap (requiring special approval).

4.1.2.1.2. Bait net fishery

This fishery is limited to two non-transferable licences. They are allowed to use a bait net, cast net or scoop net to target all fish for use as bait from the high water mark to three nautical miles seaward of the low water mark. They are not able to take Barramundi, Threadfin Salmon, Spanish Mackerel or Mud Crab and are not allowed to fish in Darwin Harbour and Shoal Bay.

4.1.2.1.3. Barramundi fishery

The fishery is restricted to 14 transferable licences that can only operate from 1 February to 30 September. Each licence allows a maximum of 1000 m of 150 mm gill net, often set and retrieved from dinghies to target Barramundi and King Threadfin from the high-water mark to three nautical miles seaward of the low water mark. A number of byproduct species are also taken which commonly include Black Jewfish, Blacktip Shark, Blue Threadfin and Queenfish. Vessel limits restrict the take of Golden Snapper, Black Jewfish and shark.

Fishing is restricted to waters seaward from the coast, river mouths and legislated closed areas that include between the Little Finnis River and the Wildman River, including Bynoe Harbour, Darwin Harbour and Shoal Bay and Kakadu National Park.

4.1.2.1.4. Coastal line

The coastal line fishery is a limited-entry fishery restricted to 52 licences. The licences allow fishing along the NT coast between the high-water mark and 15 nautical miles out from the low water mark, but access is restricted around reef fish protection areas and registered Aboriginal sacred sites.

The main target species are Black Jewfish and Golden Snapper, with byproduct species including emperors, cods and other snappers. Vertical lines, cast nets, scoop nets or gaffs can be used from the high water mark out to 15 nautical miles from the low water mark. Drop lines and up to five fish traps can be used from two to 15 nautical miles out from the low water mark. Up to five hooks per vertical line and up to 40 hooks per drop line can be used. Fishing traps can’t be used in the Western Zone from the Western Australian border to Cobourg Peninsula.

The total catch in the western zone is limited to 145 tonnes of Black Jewfish and 4.5 tonnes of Golden Snapper, managed through a transferable quota system.

4.1.2.1.5. Coastal net

The coastal net fishery is a limited-entry fishery restricted to five licences. The fishery extends from the high-water mark to 3 nautical miles out from the low water mark and

is divided into three discrete regions in which operators can fish: Darwin, Gove, and Borroloola. Nets used can be up to a maximum length of 300 m a maximum drop of 5 m and a mesh size of 65 mm or less, and they must be anchored at one end. They can also use a six meter cast net with a mesh size up to 25 mm. Mullet is the main target species but byproduct species includes Blue Threadfin, sharks, Queenfish, garfish, snappers and whiting. Barramundi, King Threadfin, Spanish Mackerel, and Mud Crab cannot be taken using a coastal net license.

4.1.2.1.6. Mollusc fishery

This is a limited-entry fishery with only one commercial licence. The licence allows the operator to work in intertidal waters from the high water mark out to the low water mark targeting molluscs only, but not pearl oyster or cephalopods.

4.1.2.1.7. Mud Crab

This is a limited-entry fishery with 49 licences, each of which is allowed to operate 60 baited pots or dillies. They are also allowed to use small mesh nets to catch bait for their pots. Fishermen generally operate across the coastal mudflats and in estuaries around the Northern Territory, but fishing is banned in Darwin Harbour, Shoal Bay, Leaders Creek and in the waterways of the Kakadu National Park. Mud Crabs are the target species and there is very little byproduct.

4.1.2.1.8. Trepang fishery

The trepang fishery is a limited-entry fishery restricted to 6 licences. Operators fish for sea cucumbers by hand, either on foot or by diving and can work from the high-water mark to three nautical miles seaward of the territorial baseline. Most fishing is done along the Arnhem coast around the Cobourg Peninsula and Groote Eylandt. Sandfish are the primary species of sea cucumber that are taken.

4.1.2.1.9. Demersal fishery

There are currently 18 non-transferable licenses in the fishery, but there is a provision to apply for new licenses. The fishery operates from 15 nautical miles from the low water mark to the outer boundary of the AFZ. It is a quota managed fishery with the main target species being Goldband Snapper, Saddletail Snapper, Crimson Snapper and Red Snapper, with byproduct species including Red Emperor and cod. A range of gears can be used to target the species including vertical lines, drop lines, long lines, baited fish traps, and demersal fish trawls in some areas.

4.1.2.1.10. Timor Reef

There are 15 non-transferable licenses currently in the fishery, but there is a provision to apply for new licenses. It is a quota managed fishery that operates in a small offshore area of 8400 square nautical miles — the Timor Box). A range of gears can be used including vertical lines, drop lines, long lines and fish traps to target primarily Goldband Snapper, Saddletail Snapper, Crimson Snapper, Red Emperor and cods.

4.1.2.1.11. Offshore net and line

This is a limited-entry fishery with 17 licences that can operate from the high watermark to the boundary of the AFZ but most fishing is done within 12 nautical miles of the

coast. Demersal or pelagic longlines or pelagic nets are used to target mainly Blacktip Sharks and Grey Mackerel but Spanish Mackerel and a range of sharks are caught as byproduct. Pelagic longlines must be manually baited and can only be used two nautical miles seaward of the territorial sea. Longlines can be no more than 15 nautical miles long with up to 1000 hooks. Pelagic nets can be up to 2000 mm long with a drop of 50 to 100 meshes and mesh size of 160-185 mm.

4.1.2.1.12. Pearl Oyster

The Pearl Oyster fishery is limited-entry with only 5 licences having access to 120 fishery units. Each fishery unit is comprised of 1150 oysters, meaning there is a maximum annual wild-catch limit of 138,000 oysters. Pearl Oysters can only be taken by hand, from the high water mark out to the AFZ. The fishery in the NT is not currently active, as most shell seeded in NT aquaculture farms is derived from hatchery-reared shell, with some coming from the wild oyster fishery in Western Australia.

4.1.2.1.13. Spanish Mackerel

This is a limited-entry fishery with only 15 licences that can operate from high water mark to the AFZ. The fishery targets Spanish Mackerel using troll lines, floating hand lines and rods fished from dories or a mother boat. Small mesh nets can also be used to catch bait but the fisher must always stay with the net.

4.1.2.1.14. Aquarium fishery

The aquarium fishery supplies a wide range of aquatic life to local, interstate and international pet retailers and wholesalers. It is a small-scale, multi-species fishery operating in freshwater, estuarine and marine habitats out to the Australian Fishing Zone (AFZ), which is 200 nautical miles offshore. Freshwater and estuarine species are generally collected between the Adelaide and Daly rivers, while most marine species are collected within 100 km of Nhulunbuy and Darwin.

A range of fishing gears can be used including: barrier, cast, scoop, drag and skimmer nets, hand pumps, freshwater pots and hand-held equipment. Species targeted include aquarium fishes (mostly rainbowfish, catfish and scats), invertebrates (hermit crabs, snails, whelks and hard and soft corals) and plants.

4.1.2.2. Commercial Aquaculture

The value of the Northern Territory's aquaculture industry increased by 52% from $15.35 million in 2011 to $23.3 million in 2012 (Northern Territory Government, 2014). This was mostly due to increases in pearl and Barramundi production.

Barramundi is the primary species in the NTs aquaculture industry. Overall, 1,011 t of seafood alone valued at $24 million was produced in the 2014–15 (Savage, 2015), an increase of 148 t from 2012 when 863 t of Barramundi was produced valued at $8.37 million (Northern Territory Government, 2014).

The Darwin Aquaculture Centre is working on developing livelihood-based enterprises in rural and remote areas to increase Indigenous aquaculture participation. They are currently trialling the culture of Trepang, Giant Clams and Tropical Rock Oyster.

An appropriately endorsed aquaculture licence is required to undertake aquaculture activities. There are two types of aquaculture licences based on the size of the operation. Small-scale aquarium hobbyists can obtain an ***ornamental aquaculture licence*** to breed and sell their fish, aquatic plants and invertebrates in a facility that holds less than 10,000 litres of water. Larger scale commercial facilities require a ***commercial aquaculture licence.***

The production of pearls from the Silver-lipped Oyster is currently the most significant commercial aquaculture industry sector in the NT, with Barramundi farming the next most valuable.

The Darwin Aquaculture Centre runs research and development programs to support aquaculture businesses in the NT. Established in 1988, it first focussed on Barramundi and then Mud Crab aquaculture. It now supports research on a range of aquaculture species including giant clams, tropical oysters and sea cucumbers.

4.1.2.2.1. Pearl

A pearl farmer must hold two types of licences — a pearl oyster fishery licence (fishing licence) and a pearl oyster culture (hatchery) licence. An operator must have a minimum of five fishing units and 15 hatchery units. Each unit is equal to 1,150 oysters and may be traded — permanently or temporarily — between licence holders. Pearl oyster farms operate in four main areas of the NT: Bynoe Harbour; Beagle Gulf; Cobourg Peninsula; Croker Island; and around the islands north west of Nhulunbuy.

4.1.2.2.2. Barramundi

There are 6 NT Aquaculture licences that are endorsed to produce Barramundi, but as of 2016, there was only one Barramundi farm in operation. That farm aimed to produce 3,500 t of Barramundi in 2018, with planned future expansions expected to bring production to 10,000 t per year.

4.1.2.2.3. Ornamental Fish

The NT has a small but developing ornamental aquaculture industry. Ornamental aquaculture produces plants and animals for the aquarium market, including freshwater and marine fish, shellfish, corals, and a wide variety of aquatic plants.

4.1.2.2.4. Sea Cucumber

Sandfish is a valuable species of sea cucumber found across tropical northern Australia that has historically been caught and traded by Aboriginals. It has been successfully farmed in many countries, including China, the Philippines and Fiji. There is a business-led initiative to find and develop Sandfish ranching sites around Indigenous communities in the NT and improve hatchery production techniques in leased facilities of the Darwin Aquaculture Centre.

4.1.2.2.5. Black-lipped Rock Oyster

The Tropical or Black-lipped Rock Oyster has also historically been harvested by remote Indigenous communities for food and trade. The potential for hatchery production of Black-lipped Oyster and sea-based growing techniques that will suit remote Indigenous communities in the NT are being investigated.

4.1.2.2.6. Giant Clam

Farmed clams can be used for export, conservation programs and traditional food and cultural purposes. Through the Darwin Aquaculture Centre, NT Fisheries is looking at the potential for Indigenous communities to be involved in farming clams. Trials on Groote Eylandt and Goulburn Island are looking at growing clams in sea-based cages.

4.2. Survey results – Indigenous sector

Only 11 online survey responses were received from the Indigenous sector, most of whom participated in cultural fishing but about half of which were also involved with ACLs. Results were augmented by through face to face interviews. The age of respondents to the online survey ranged from the 25–34-year-old category to the 55–64-year-old category (Figure 5). Seven were male and four female (Figure 6). The most common involvement in the Indigenous fishing was cultural fisher, followed by ranger and recreational fisher (Figure 7). Two respondents were involved with ACLs and two were involved with fisheries management advisory committees.

Community and people were as the greatest priority of the five FRDC programs (Figure 8), while societal issues were considered the most important factor affecting Indigenous fishing followed by environmental issues (Figure 9). Sustainability of target species was considered the most important environmental issue followed by bycatch sustainability, discarding and habitat impact (Figure 10). Regulatory complexity ranked highest of the societal issues, however this is overshadowed by the combination of issues that related to access: resource sharing / allocation and Native Title / ALRA and access (Figure 11). This is supported by open ended answers to questions regarding the greatest biggest issue in their fishery (Figure 14). Respondents considered training and infrastructure the most important economic issue facing Indigenous fishing (Figure 12) Pollution, coastal development and climate change were considered the most important external issues (Figure 13). When asked what was the single biggest issue regarding Indigenous fishing in the NT, issues associated with commercial opportunities and access were most prominent (Figure 14).

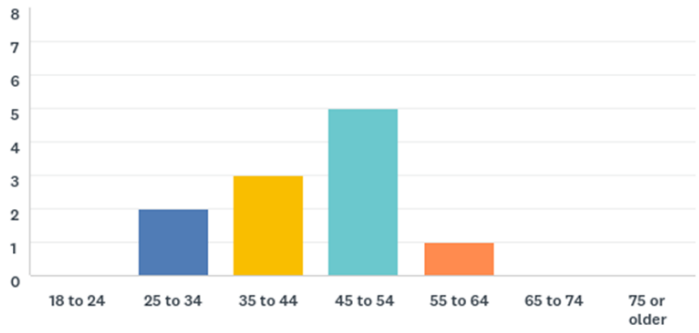


Figure 5. Age distribution of the Indigenous survey respondents (n=11)

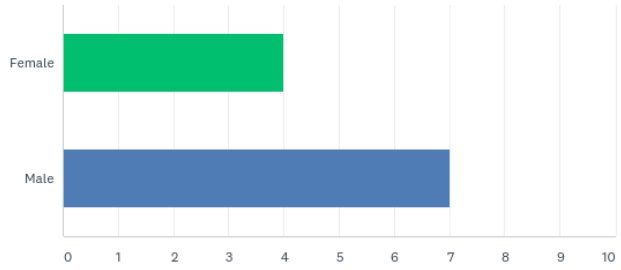


Figure 6. Gender of the Indigenous survey respondents (n=11)

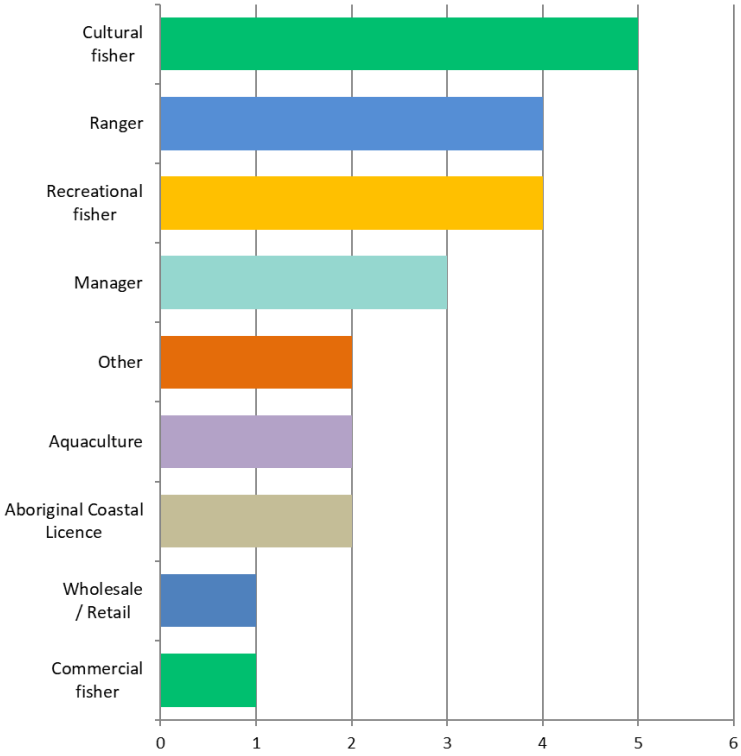


Figure 7. Fisheries in which the Indigenous survey respondents were involved (n=11)

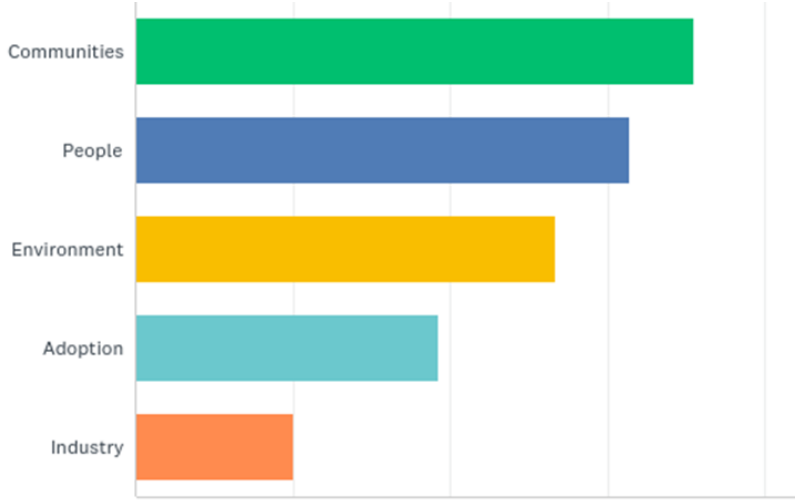


Figure 8. Indigenous respondents' prioritisation of FRDC RD&E areas (n=11)

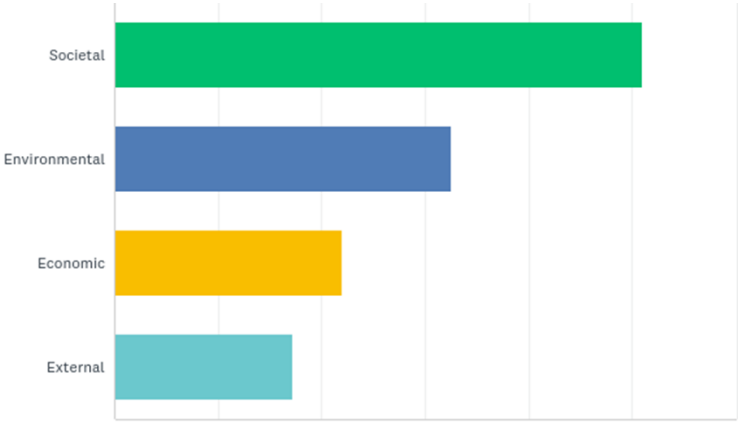


Figure 9. Respondents prioritisation of factors affecting Indigenous fishing (n=11).

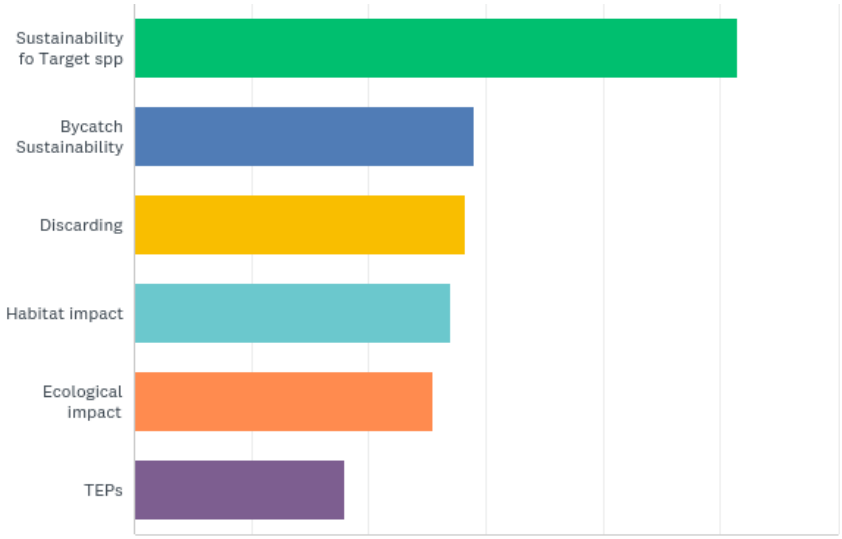


Figure 10. Respondents prioritisation of environmental issues affecting Indigenous fishing (n=10)

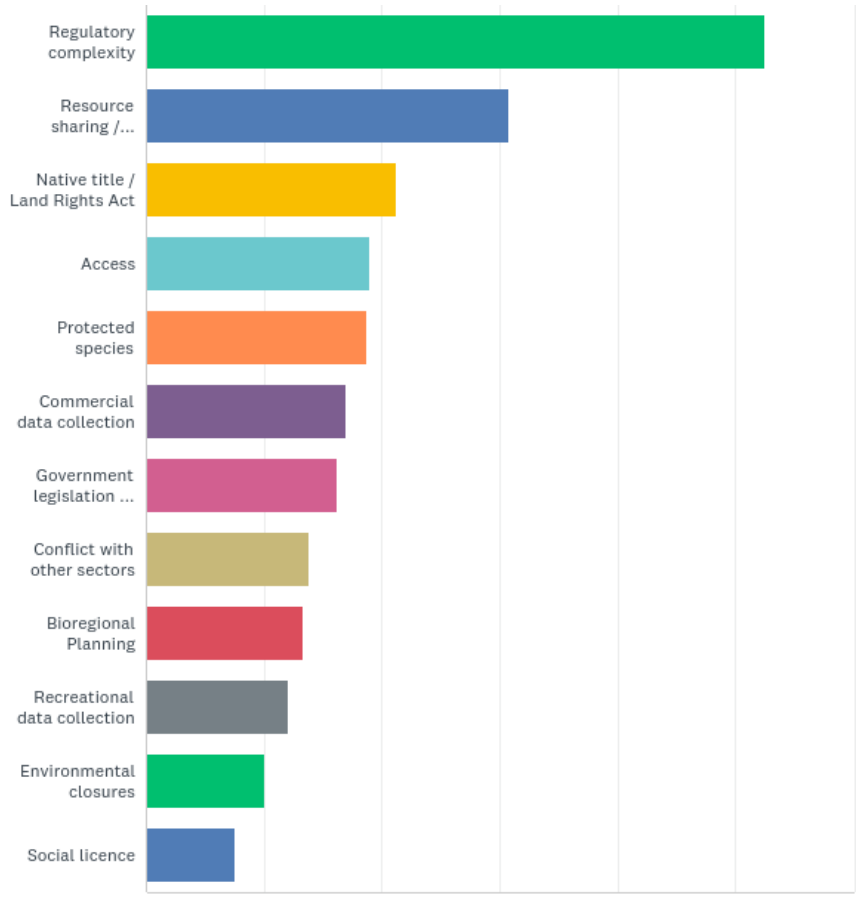


Figure 11. Respondents prioritisation of societal issues affecting Indigenous fishing (n=10)

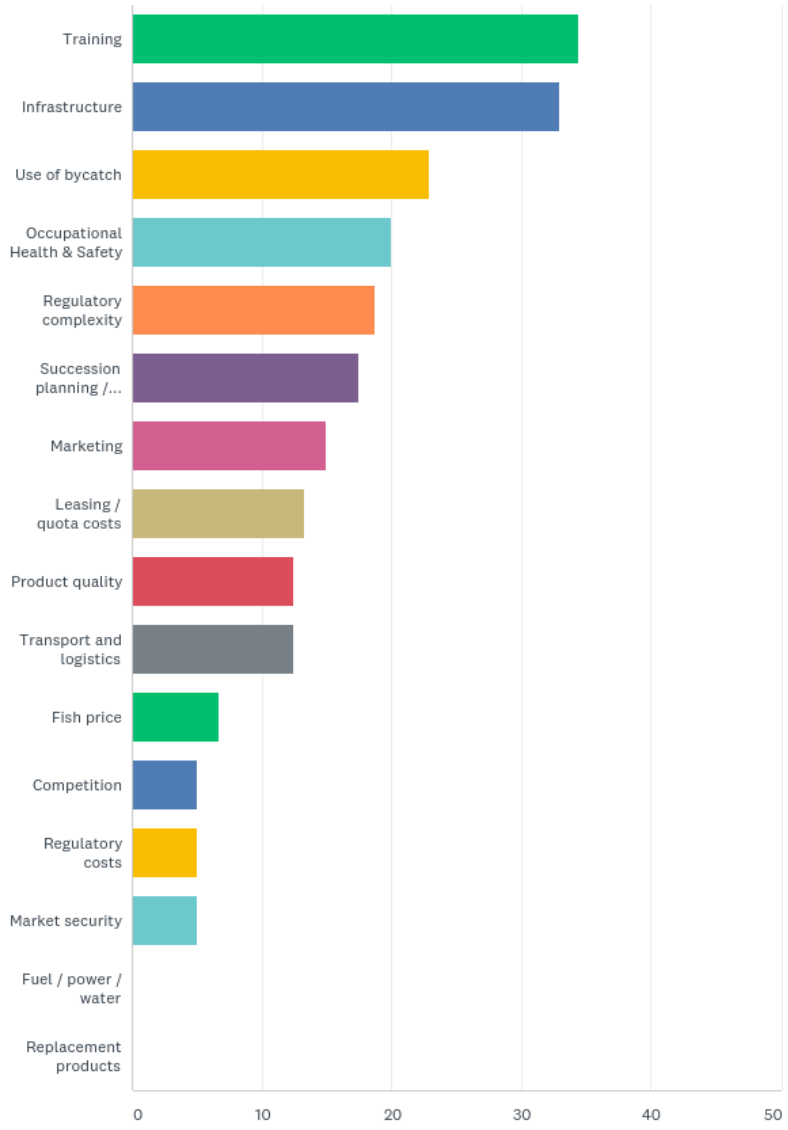


Figure 12. Respondents prioritisation of economic issues affecting Indigenous fishing (n=10)

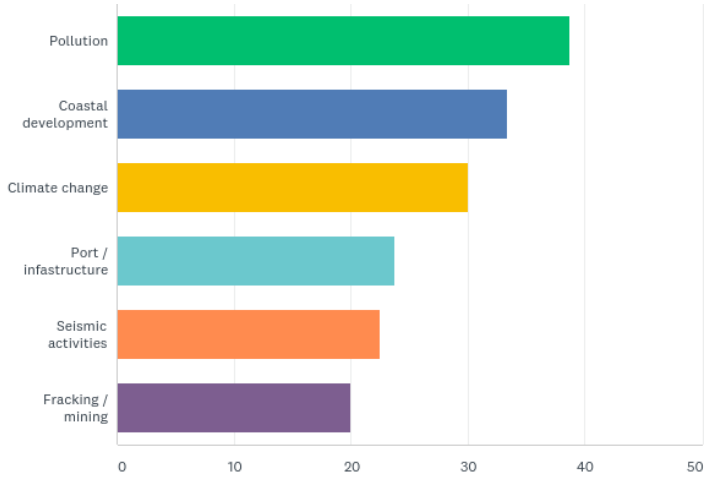


Figure 13. Respondents prioritisation of external issues affecting Indigenous fishing (n=10)

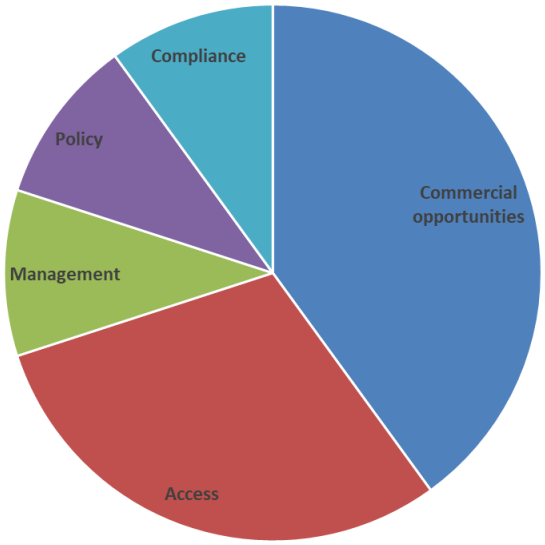


Figure 14. Categorised survey responses to "single biggest issue regarding Indigenous fishing and businesses". Answers were received from 10 of the 11 total respondents.

4.3. Survey results – Recreational sector

There was a total of 230 online survey responses from the recreational sector. A good representation of people that fished around the NT was received, with most respondent indicating they fish around Darwin Harbour and surrounds (Figure 15). Respondents comprised all age groups, with the 45–54-year-old age group the most common (Figure 16). 85% of respondents were male (Figure 17).

Questioned about the FRDC priority areas, the environment was ranked the greatest importance (Figure 18) and was also considered as the most important factor affecting recreational fishing (Figure 19), particularly the sustainability of target species and habitats (Figure 20), but mortality associated with catch and release was also considered important. Regarding societal issues that affect recreational fishing (Figure 21), particularly artificial reefs/ FADs ranked highest, while boat ramp facilities was ranked third highest. If combined together, access, resource sharing and the implications of the Blue Mud Bay decision far outweighed other societal issues for the recreational sector. The need for recreational data and commercial data to inform management was also seen as important. Coastal management fracking/mining and pollution were the most important external issues facing recreational fishing (Figure 22). When asked what was the single biggest issue regarding recreational fishing in the NT, issues associated with access were most prominent, followed by concerns about commercial fishing, particularly barramundi net fishing (Figure 23).

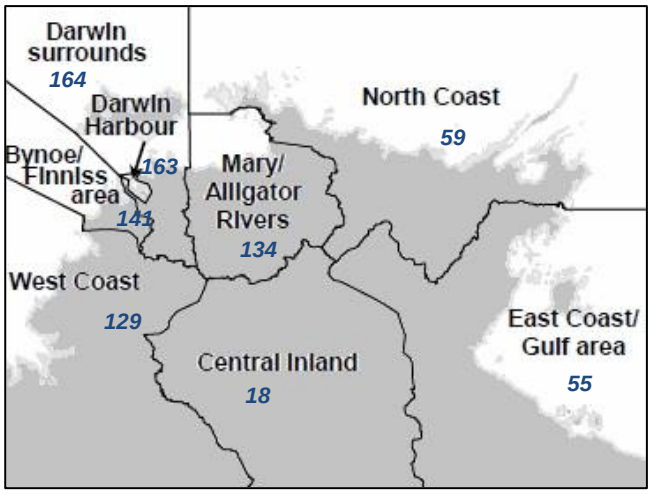


Figure 15. Regions where respondents undertook recreational fishing (n=225)

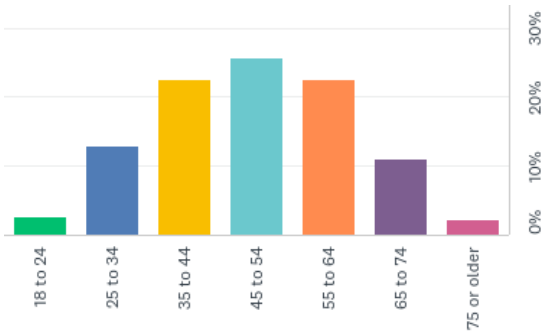


Figure 16. Age distribution of the recreational survey respondents (n=225)

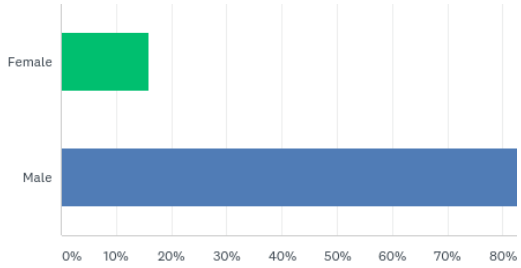


Figure 17. Gender of the recreational survey respondents (n=225)

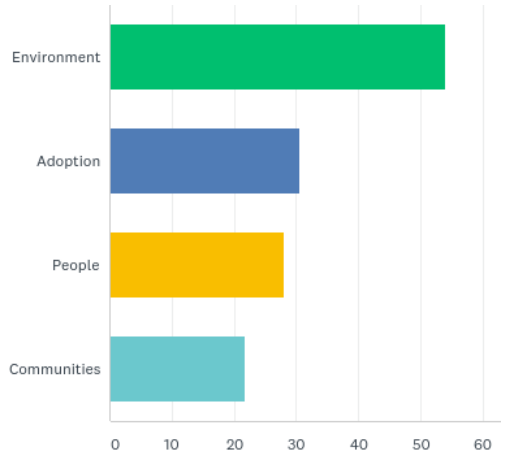


Figure 18. Recreational respondents' prioritisation of FRDC RD&E areas (n=209)

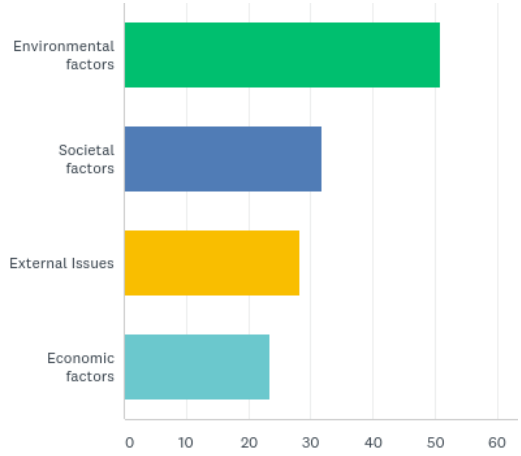


Figure 19. Respondents prioritisation of factors affecting recreational fishing (n=207)

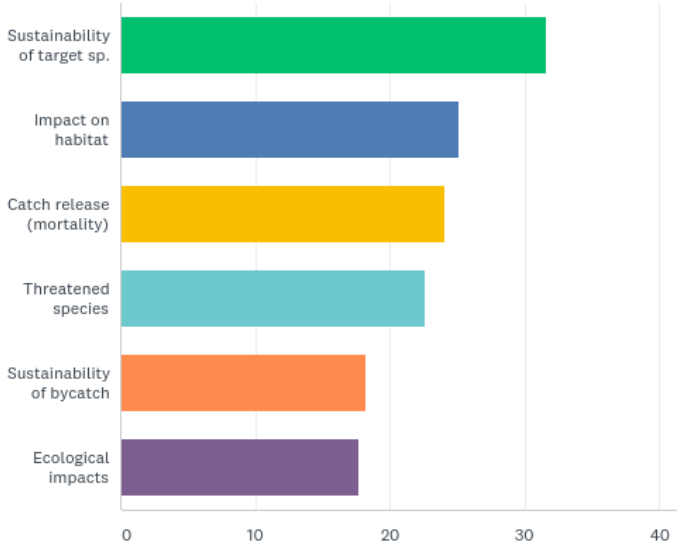


Figure 20. Respondents prioritisation of environmental issues affecting fishing (n=203)

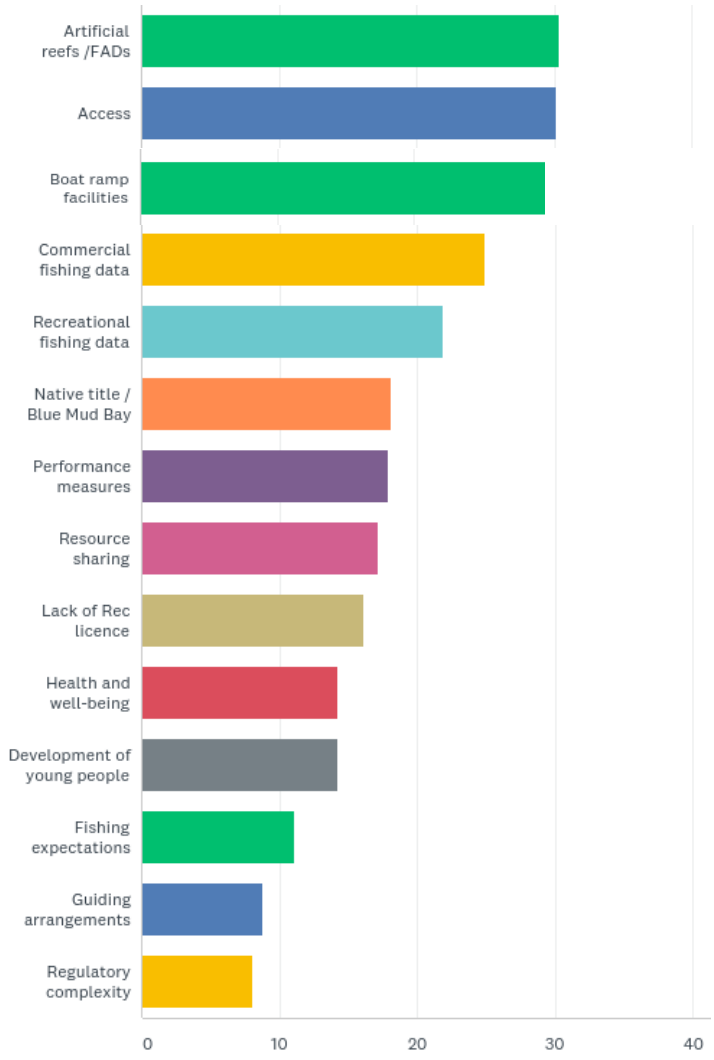


Figure 21. Respondents prioritisation of societal issues affecting fishing (n=196)

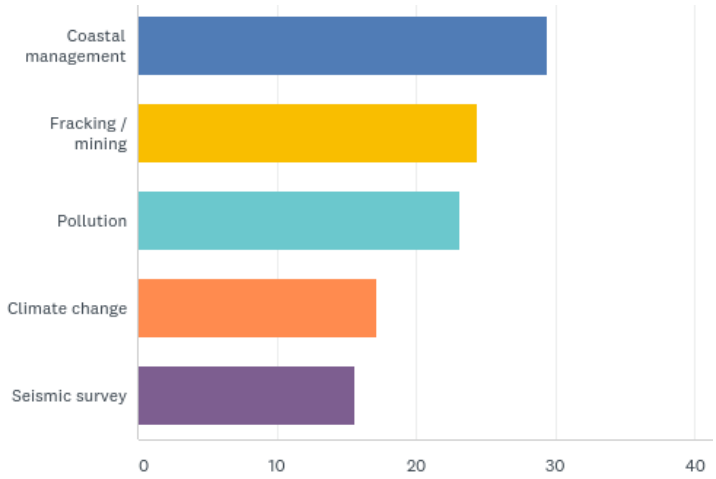


Figure 22. Respondents prioritisation of external issues affecting fishing (n=196)

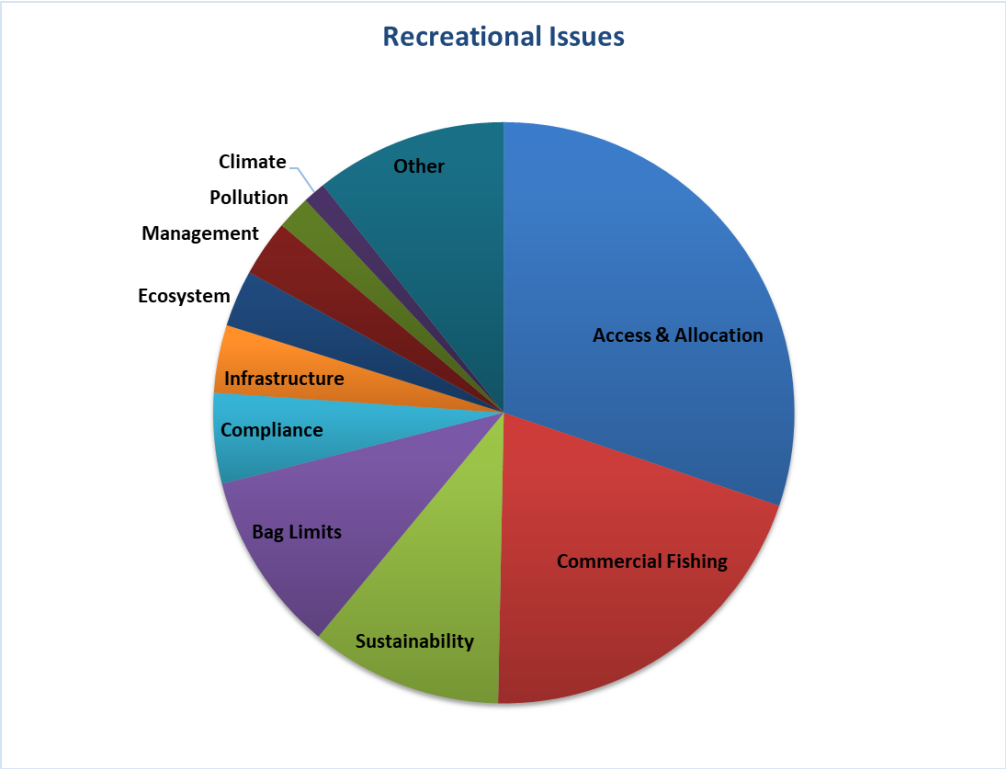


Figure 23. Categorised survey responses to "single biggest issue regarding recreational fishing". Answers were received from 160 of the 230 total respondents.

4.4. Survey results – Commercial wild-catch

There were 34 online survey responses from the commercial wild-catch sector, and based on feedback from NTSC, this was considered to be a reasonable representation of their industry. This is supported by the good cross section of fisheries represented by the online respondents (Figure 24) and their range of involvement across the supply chain (Figure 25). A broad range of ages were represented (Figure 26) of which about 85% were male (Figure 27).

Questioned about the FRDC program areas, industry (e.g. business profitability, international competitiveness, opportunities for productivity increases, resource access, and experience or well-being benefits) was ranked the greatest importance (Figure 28) followed by environment – predominantly the sustainability of target species (Figure 30). Economic factors (e.g. economic impact, infrastructure and infrastructure planning, market access, market security, product quality, traceability) were considered as the most important factor affecting wild catch fishing (Figure 29) and seafood businesses. Similar to recreational responses, access was the greatest societal issue that affected commercial wild-catch fishing (Figure 31), and if combined with Blue Mud Bay / Native Title and resource sharing, this issue far outweighed any other issue. Data collection to inform management of commercial fishing was the next greatest individual issue. With regard to economic issues, market security was of greatest importance but was followed closely by OH&S issues, use of byproduct and regulatory complexity (Figure 32). Finally, regarding external issues, port infrastructure was the greatest concern, followed by seismic activity, climate change and coastal management (Figure 33). When asked what was the single biggest issue regarding commercial wild-catch fishing in the NT, issues associated with access were most

prominent, followed by concerns about fishery management and data on stocks (Figure 34).

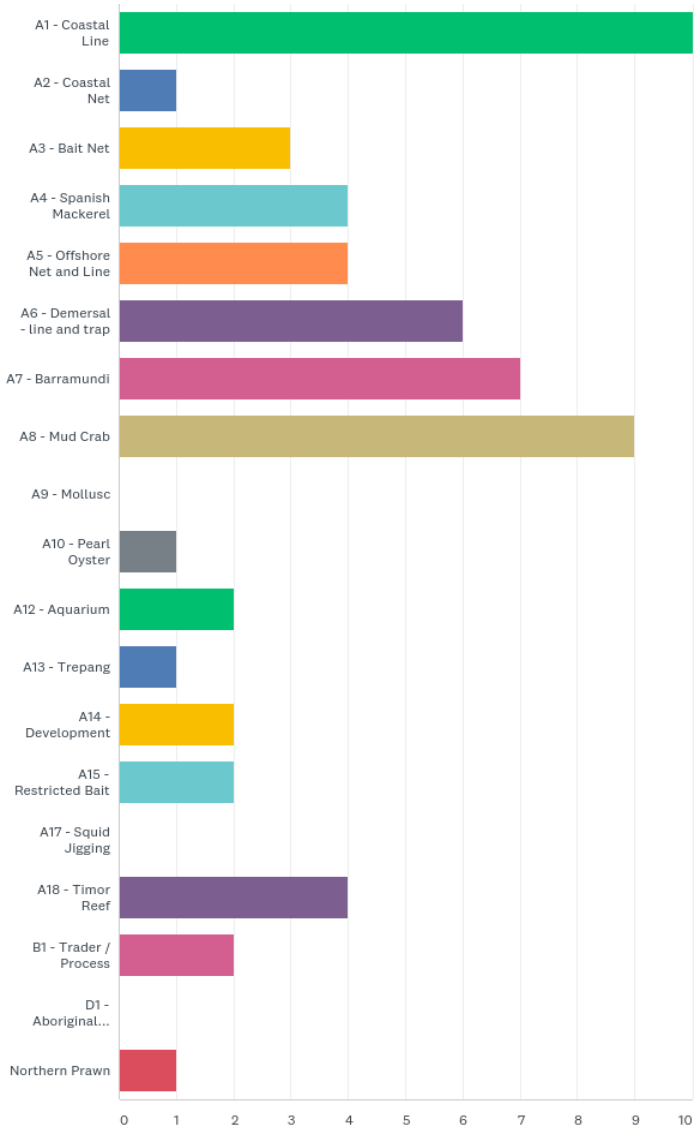


Figure 24. Fisheries in which the respondents were involved (n=33)

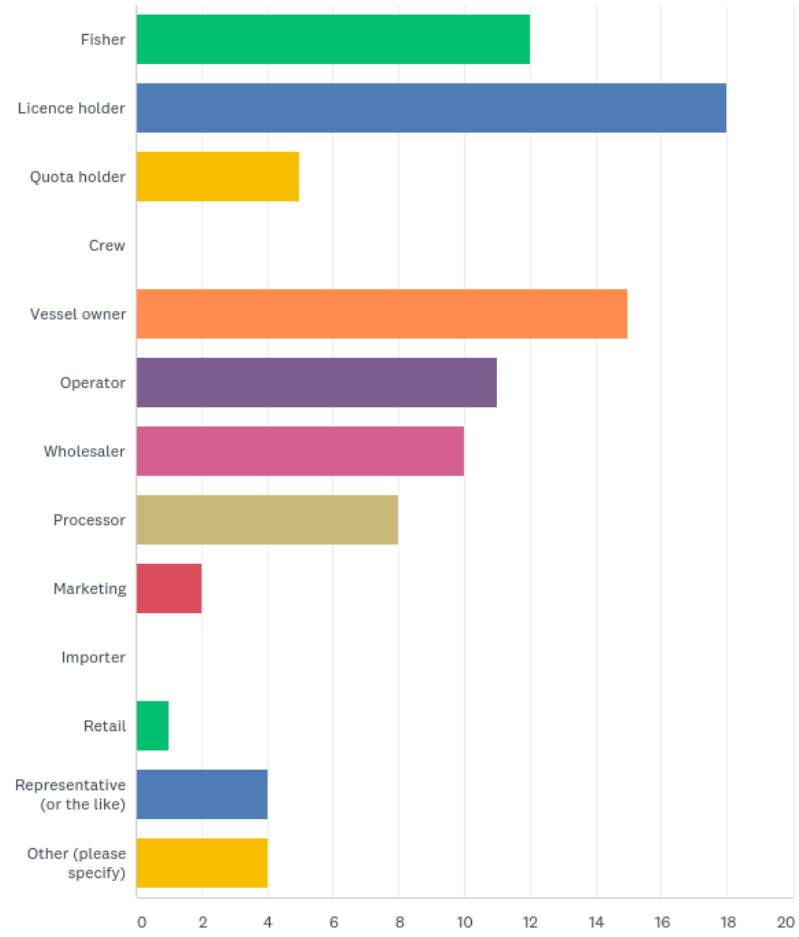


Figure 25. Main involvement of the respondents in wild-catch fisheries (n=33)

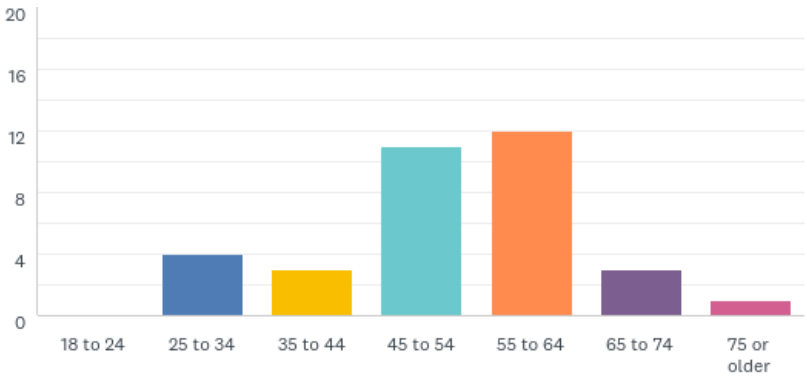


Figure 26. Age distribution of the survey respondents (n=34)

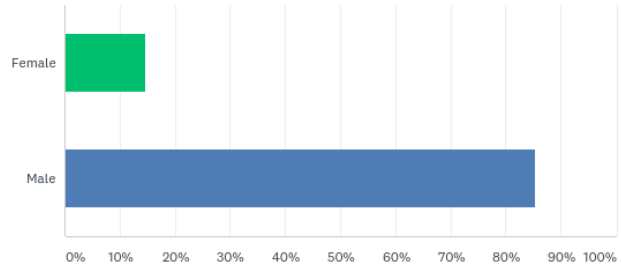


Figure 27. Gender of the survey respondents (n=34)

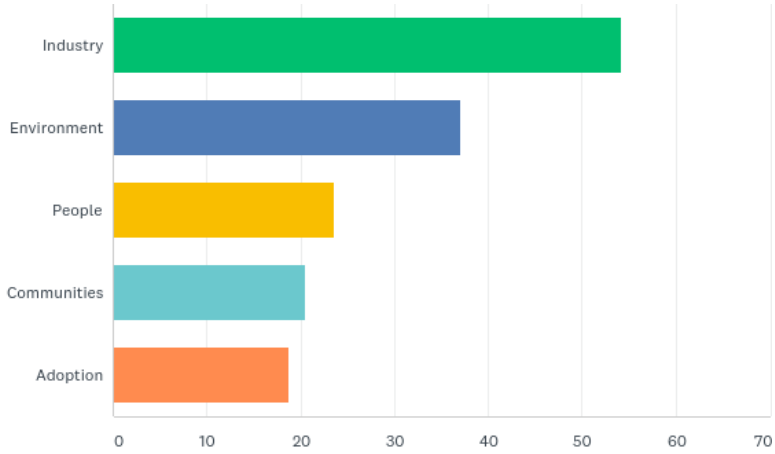


Figure 28. Respondents prioritisation of FRDC RD&E areas (n=30)

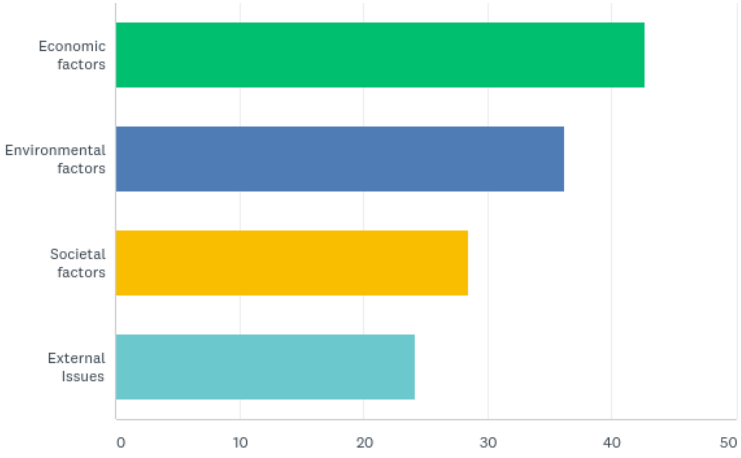


Figure 29. Respondents prioritisation of factors affecting wild-catch fisheries / businesses (n=30)

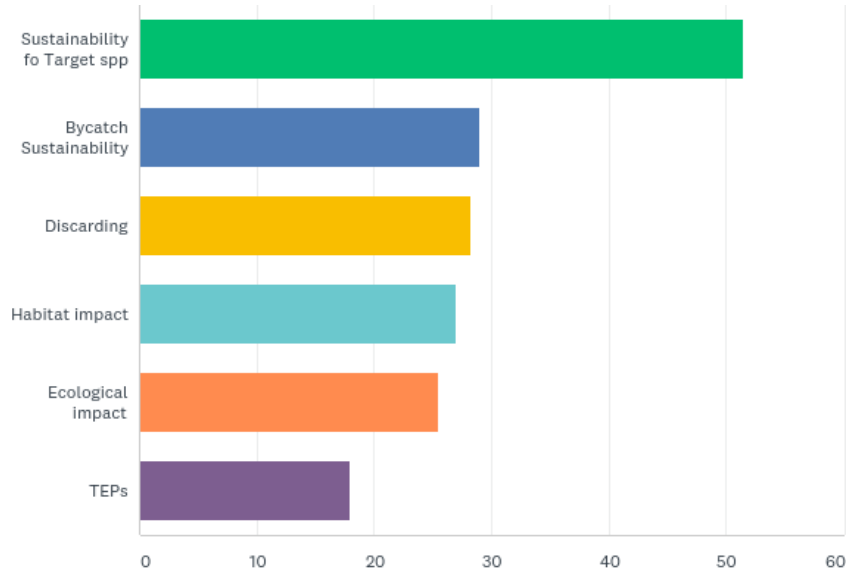


Figure 30. Respondents prioritisation of environmental issues affecting wild-catch fisheries / businesses (n=29)

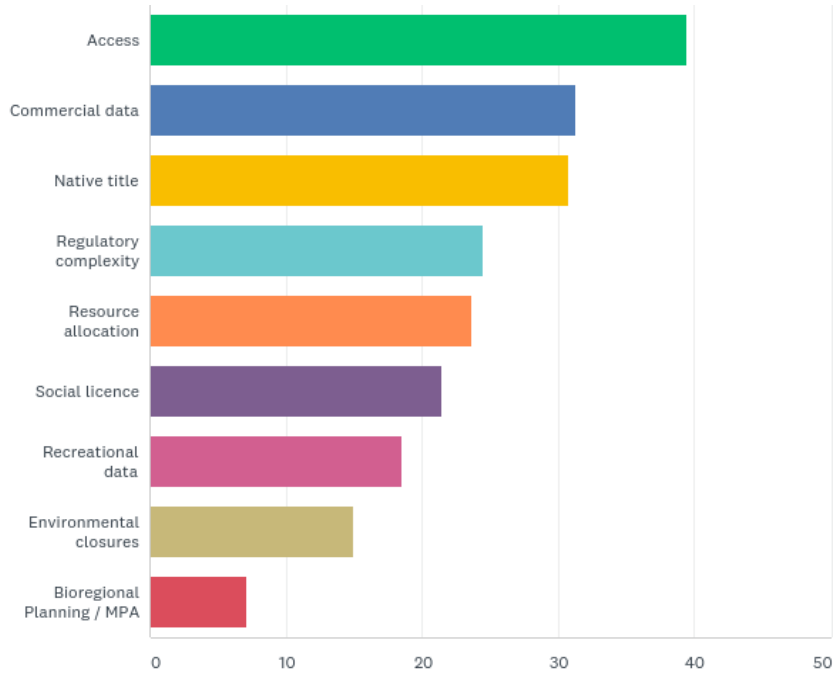


Figure 31. Respondents prioritisation of societal issues affecting wild-catch fisheries / businesses (n=29)

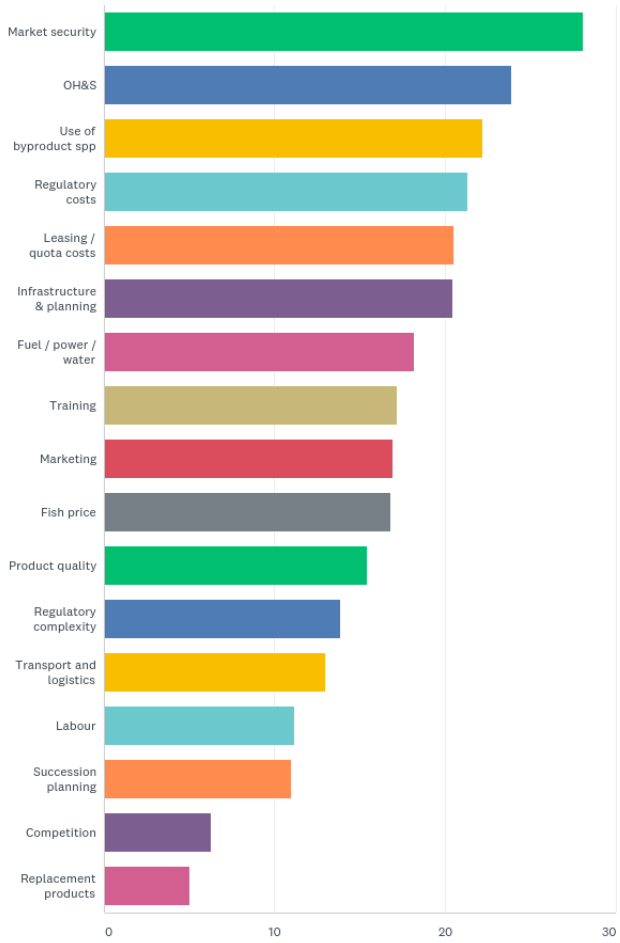


Figure 32. Respondents prioritisation of economic issues affecting wild-catch fisheries / businesses (n=27)

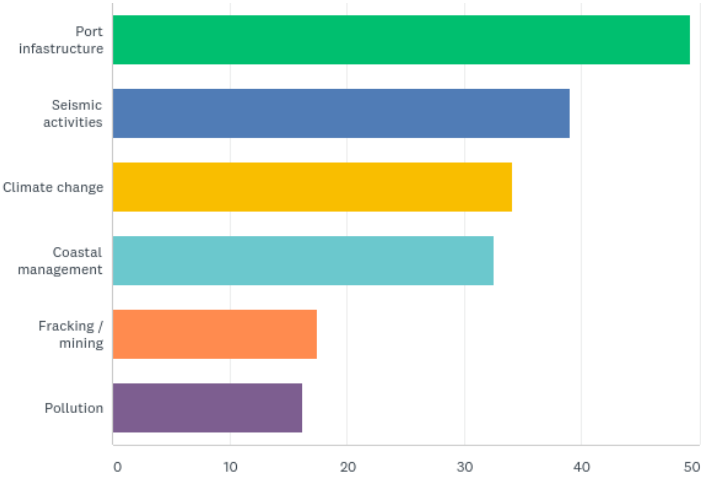


Figure 33. Respondents prioritisation of external issues affecting wild-catch fisheries / businesses (n=27)

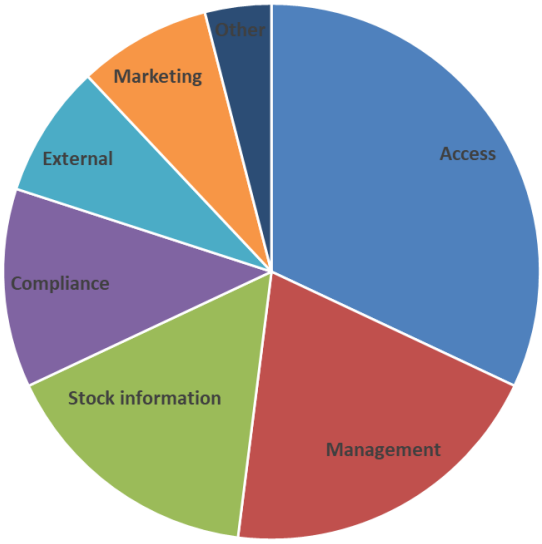


Figure 34. Categorised survey responses to "single biggest issue regarding wild-catch fishing and businesses". Answers were received from 25 of the 34 total respondents.

4.5. Survey results – Commercial aquaculture

There were only 6 online survey responses from the commercial aquaculture sector, but because it is a developing sector with only a few industry members, we were able to cover all of the major areas of aquaculture (Figure 35, Figure 36) with only a few people.

With regard to the FRDC priority areas, environment was the highest ranked area (Figure 37) and was also considered the most important factor affecting aquaculture (Figure 38), mainly due to biosecurity issues (Figure 39). Similar to both recreational and commercial wild-catch, access was the greatest societal issue for aquaculture (Figure 40). The most important economic issue was the costs of fuel, power and water to aquaculture enterprises (Figure 41). Respondents considered that the biggest external issues were licencing arrangements and policy and management issues (Figure 42). When asked what the single biggest issue regarding commercial aquaculture operations in the NT was, food production and breeding were prominent, (Figure 43).

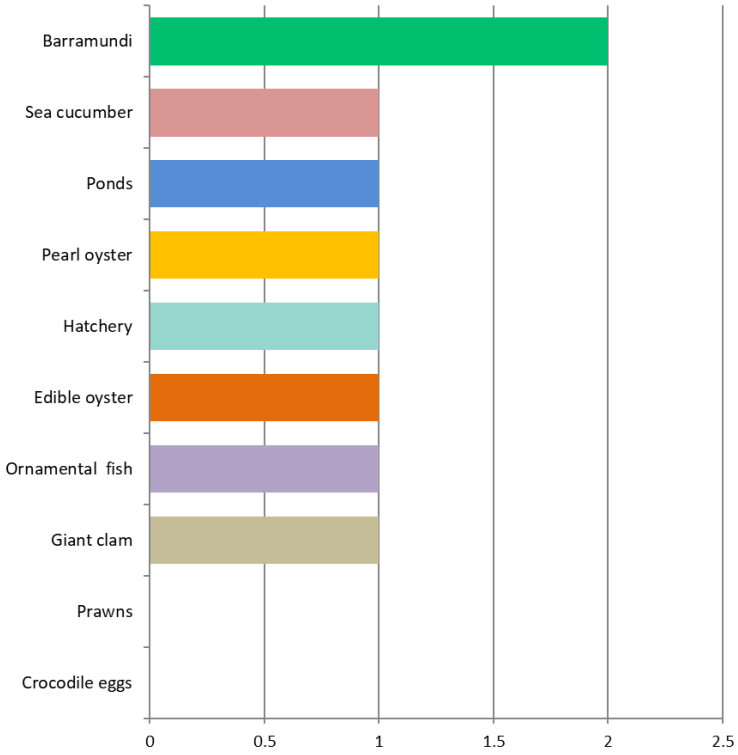


Figure 35. Aquaculture enterprises in which the survey respondents were involved (n=6)

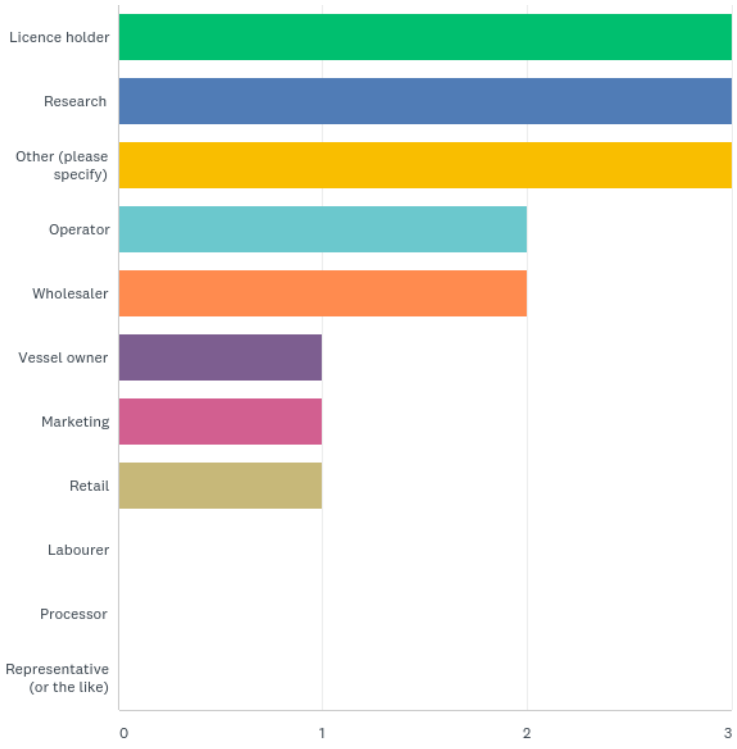


Figure 36. Main involvement of the respondents in aquaculture (n=6)

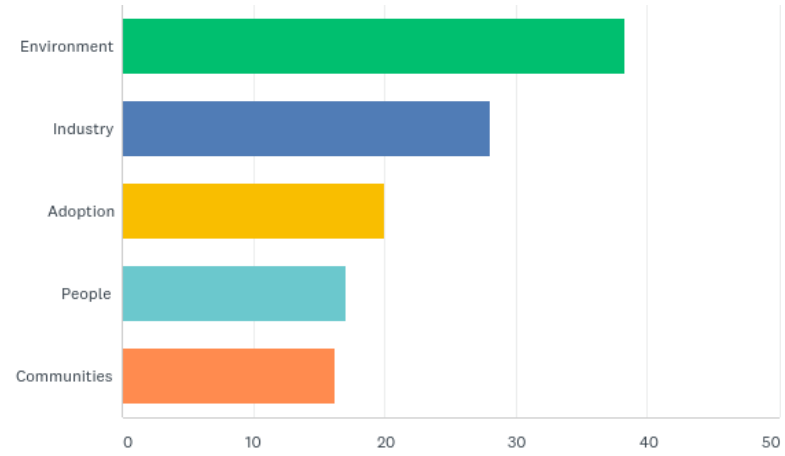


Figure 37. Aquaculture respondents' prioritisation of FRDC RD&E areas (n=6)

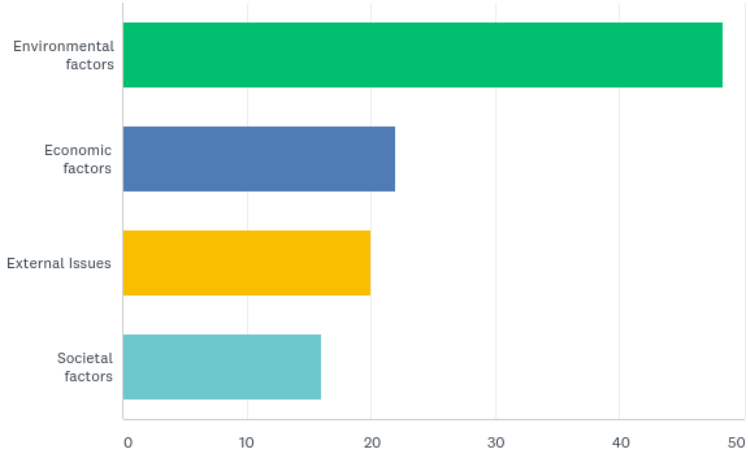


Figure 38. Respondents prioritisation of factors affecting aquaculture (n=6)

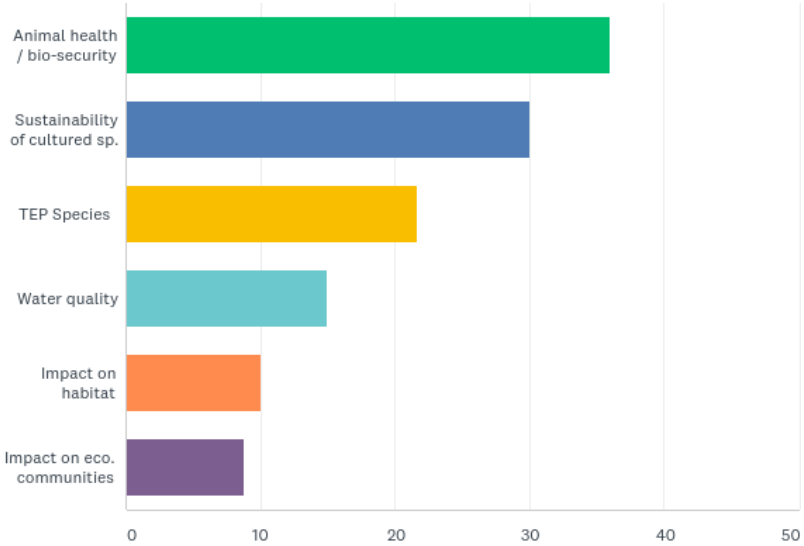


Figure 39. Respondents prioritisation of environmental issues affecting aquaculture (n=5)

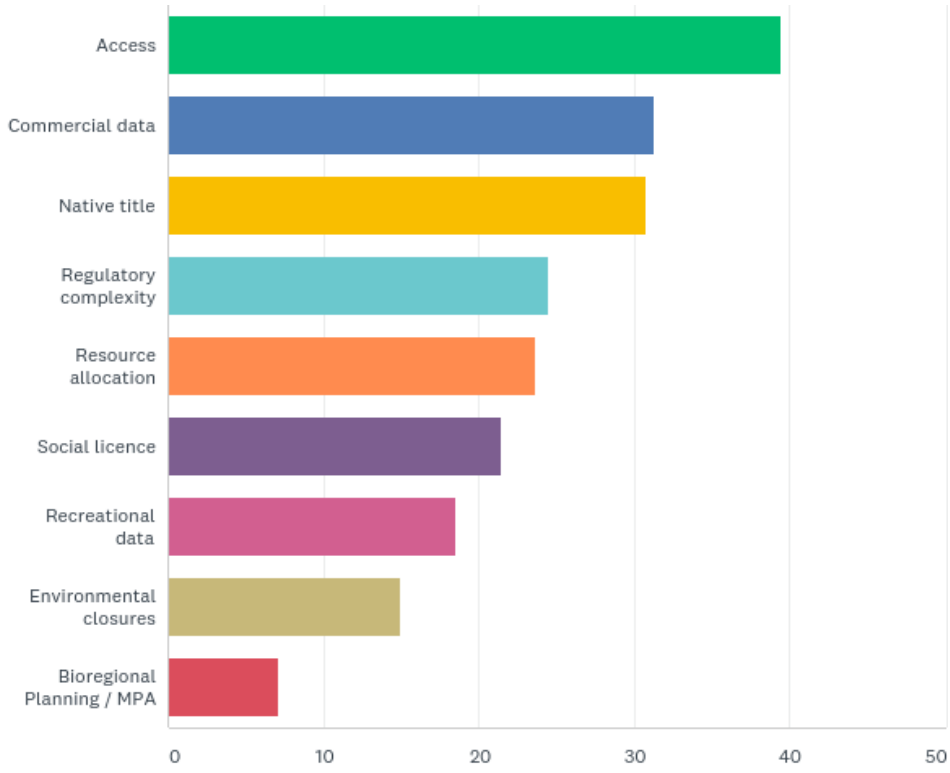


Figure 40. Respondents prioritisation of societal issues affecting aquaculture (n=5)

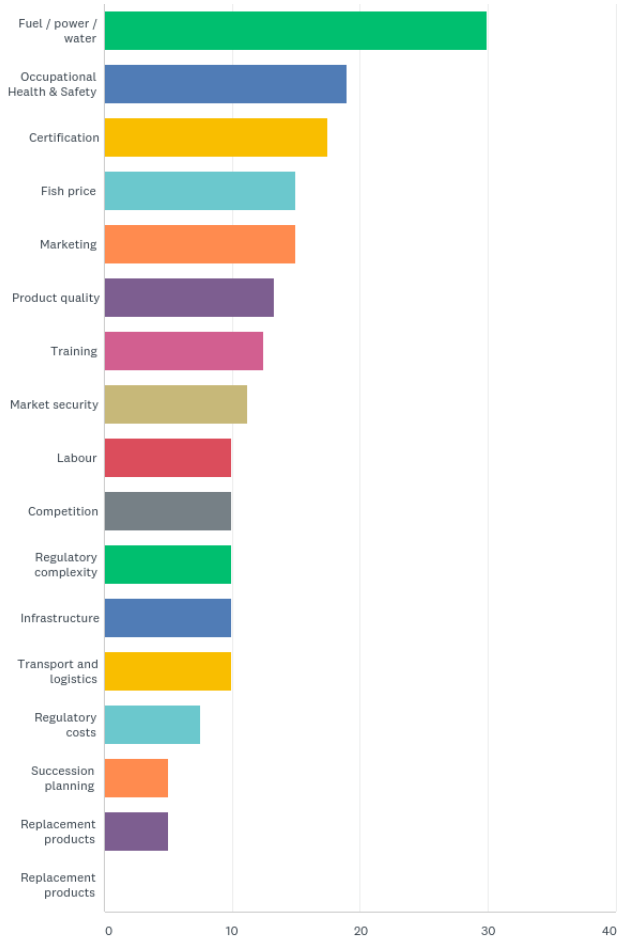


Figure 41. Respondents prioritisation of economic issues affecting aquaculture (n=5)

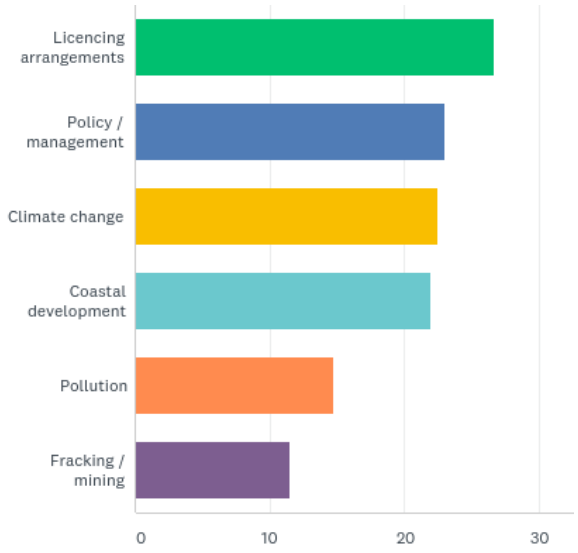


Figure 42. Respondents prioritisation of external issues affecting aquaculture (n=5)

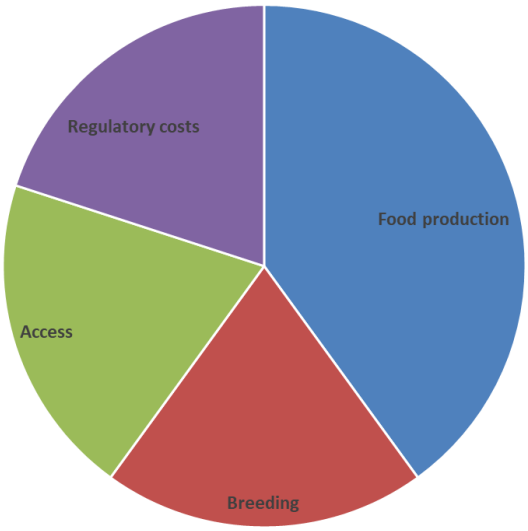


Figure 43. Categorised survey responses to "single biggest issue regarding aquaculture". Answers were received from 5 of the 6 total respondents.

4.6. Survey results – Fishery services

Twenty-three "fishery services" people responded to the survey, mostly involved in fisheries research and management across a range of sectors and with a good cross-section of age and gender (Figure 44 to Figure 47).

The most important priority area was considered as environment (Figure 48 and Figure 49) particularly the sustainability of target species, impact on ecological communities and habitat (Figure 50). There was a broad range of societal issues considered important including the benefits of fishing to well-being, artificial reefs and FADs and collection of commercial fisheries catch and effort data (Figure 51). Most popular economic issues were use of bycatch species, marketing and product quality (Figure 52). Coastal development and climate change were considered important external factors (Figure 53).

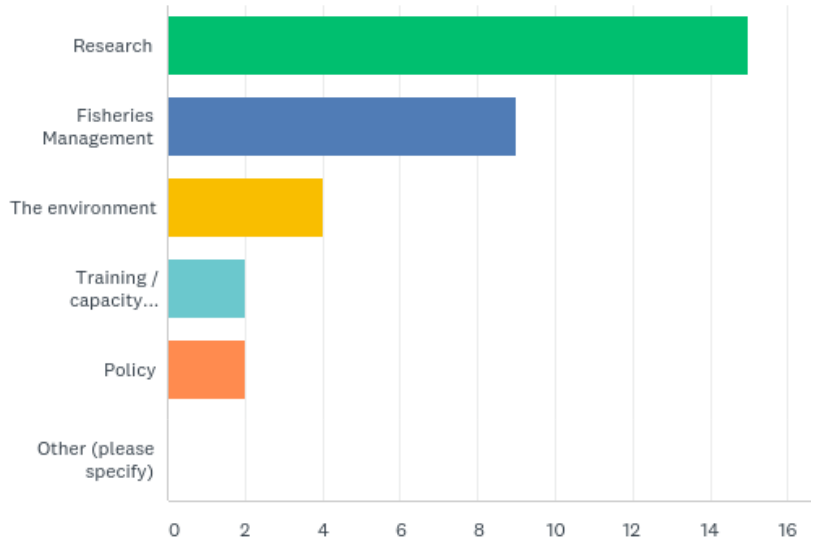


Figure 44. Fisheries area in which the respondents were involved (n=19)

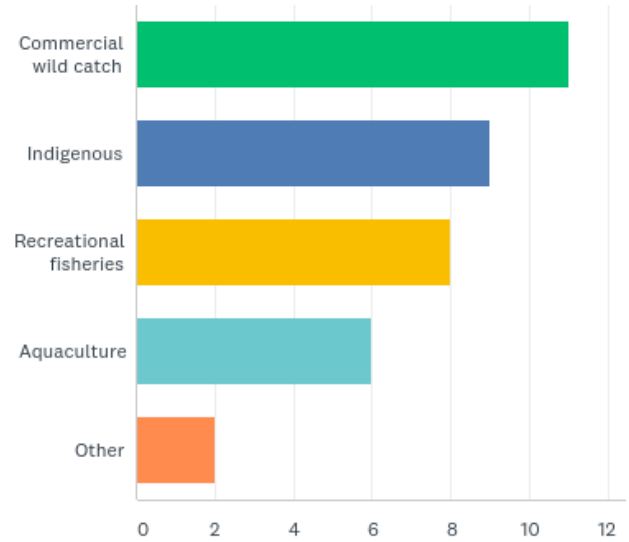


Figure 45. Fisheries sector in which the respondents were involved (n=19)

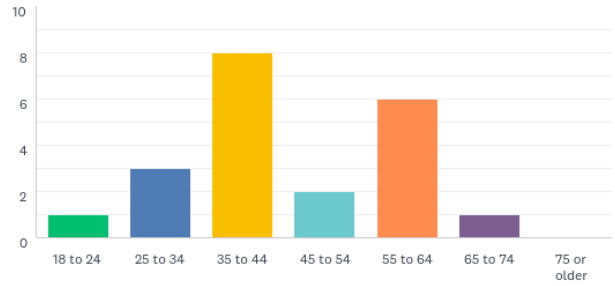


Figure 46. Age distribution of the survey respondents (n=21)

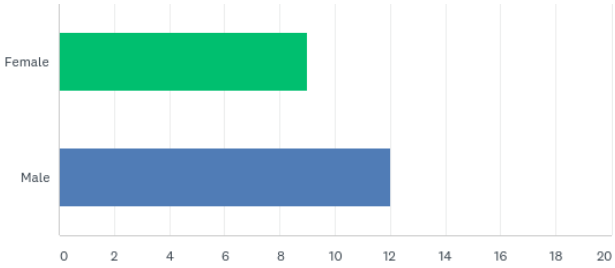


Figure 47. Gender of the survey respondents (n=21)

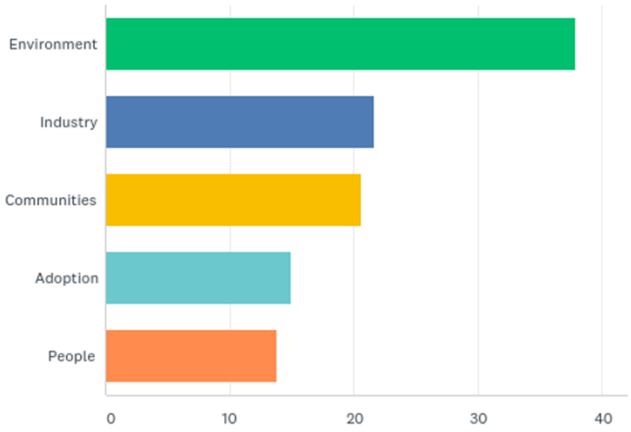


Figure 48. Respondents prioritisation of FRDC RD&E areas (n=19)

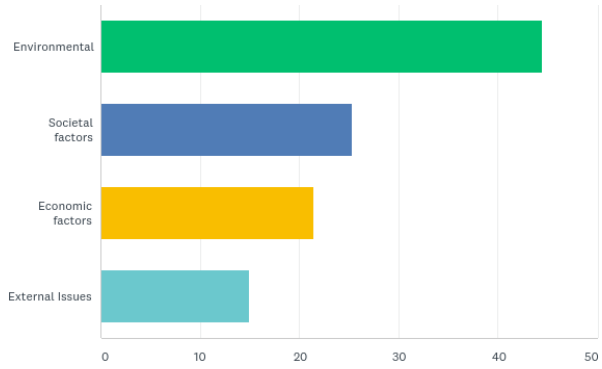


Figure 49. Respondents prioritisation of factors affecting their service area (n=19)

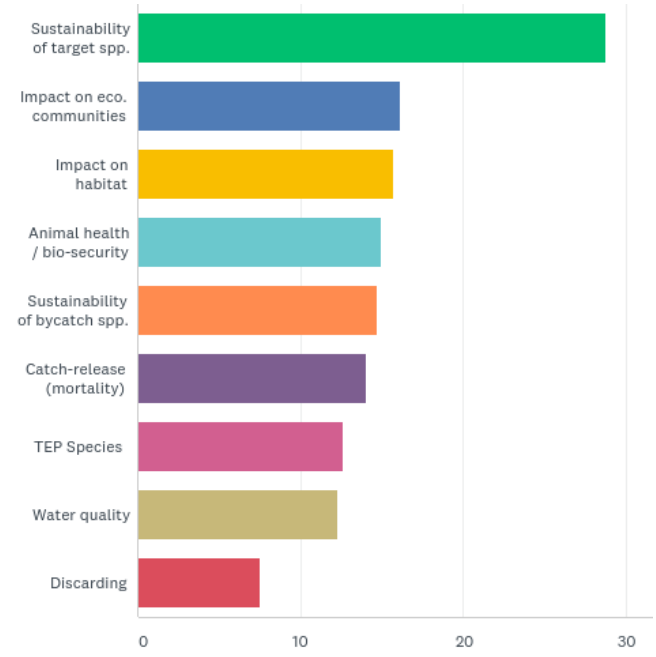


Figure 50. Respondents prioritisation of environmental issues affecting their service area (n=18)

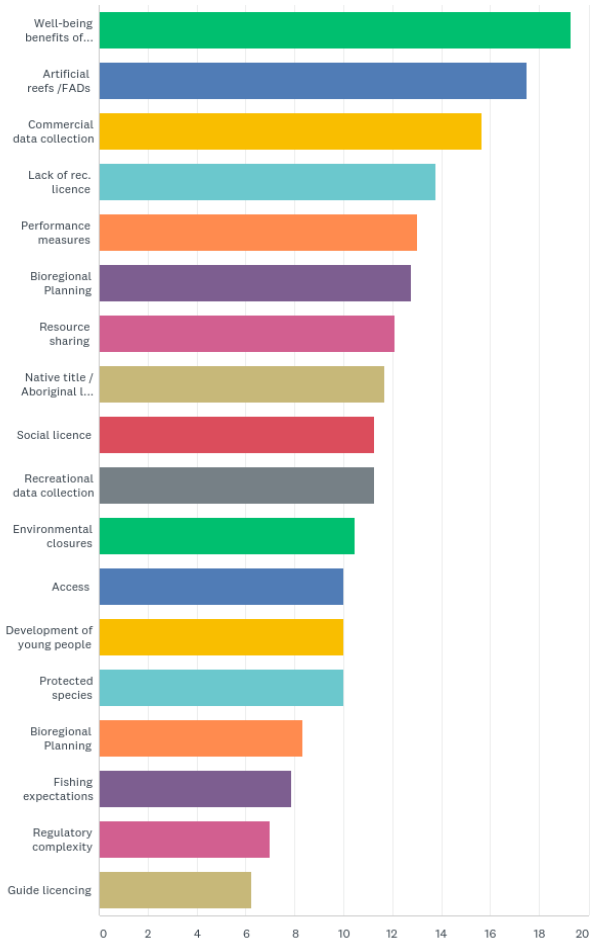


Figure 51. Respondents prioritisation of societal issues affecting their service area (n=18)

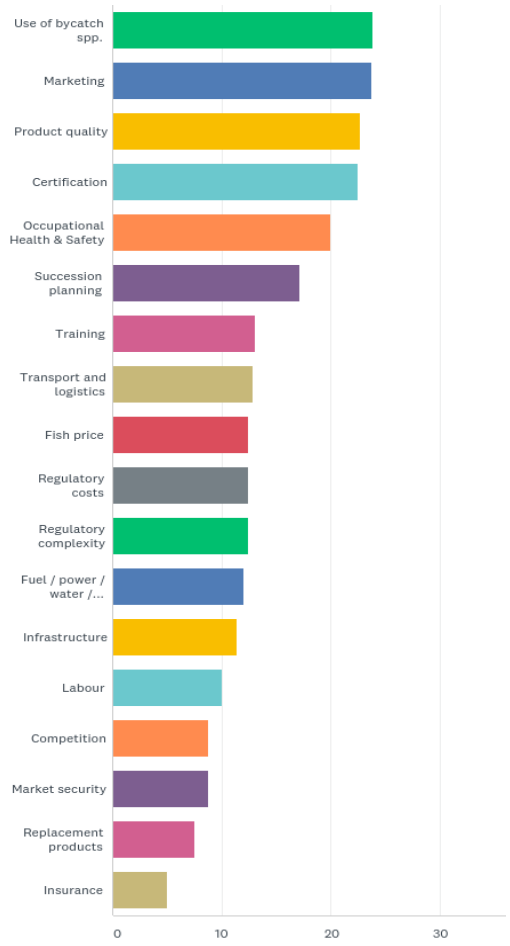


Figure 52. Respondents prioritisation of economic issues affecting their service area (n=18)

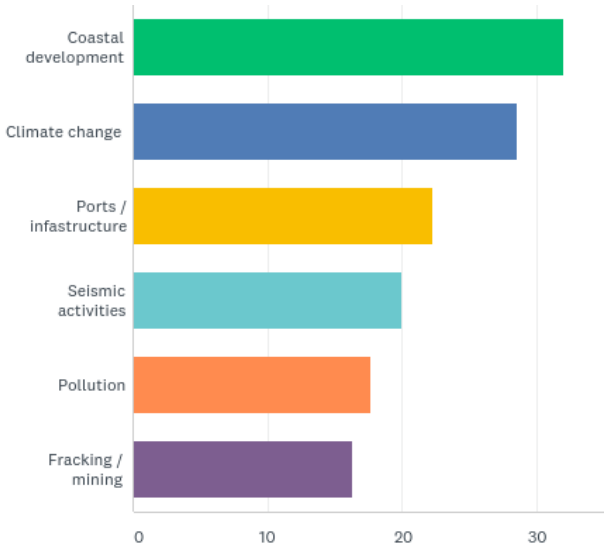


Figure 53. Respondents prioritisation of external issues affecting their service area (n=18)

5. Discussion and Conclusions

5.1. Drivers

5.1.1. Environmental Drivers:

Sustainable resource use is a clear driver for all fishing and aquaculture nationally and it is a priority area for RD&E in the Northern Territory. Being able to assess the status of stocks and to guide use that is consistent with long term ecosystem sustainability depends on RD&E that can elicit better (and more affordable) methods to understand sustainability, often in a data poor and/or capacity-limited operating environment. The environmental drivers that we recognise as shaping our research priorities include: sustainability of target species, bycatch and threatened species; impacts on habitat; post-release mortality; biosecurity, ecosystem integrity and climate change. Notwithstanding of the overall state of NT fishery stocks and the broader ecosystem, all sectors are particularly interested in ensuring the resources within their areas of interest are sufficiently healthy to support the various needs and values that exist at a local scale.

5.1.2. Societal Drivers:

Fisheries are a public resource, that can enable a public good, and how resources are used needs to be framed according to community expectation and issues of fairness and equity. Territorians have varied expectations regarding the use of aquatic resources which reflect diverse cultural, social and economic backgrounds and environmental opinions. A clear understanding of these expectations needs to inform how the optimal and equitable use of our resources is defined. The quality of fishing experiences is affected by a diverse range of real or perceived issues that can include impacts to shared resources and visual amenity associated with sharing fishing grounds with other sectors.

The sea is an inseparable part of Aboriginal 'Country' and identity. All of the Land Councils recognise the societal value of Freshwater and Saltwater Country to their communities. Continued and ongoing access to this aspect of Country is critical to individual fishers and broader Indigenous communities, not just for food and economic wellbeing, but because it incorporates spiritual beings and sacred sites that are fundamental to Aboriginal understandings of creation, ceremony and religion. It represents a continuum between Aboriginal culture in the distant past and contemporary coastal Aboriginal societies[5]. It is critical that other sectors recognise this special connection of Indigenous people with Land and Sea Country.

Specific Indigenous societal drivers that can be addressed by RD&E include: definition and recognition of specific totems and sacred sites on sea country, recognising differing sectoral expectations and values; access to fishing grounds and resource allocation (sharing); capacity building of Indigenous people to work in fisheries-related fields; and partnerships and agreements with Traditional Owners.

[5] Living on Saltwater Country. Review of literature about Aboriginal rights, use, management and interests in northern Australian marine environments. National Oceans Office, 2004.

It is important that recreational fishers and FTOs maintain access to fishing grounds. This encompasses entry to fishing locations (through the Aboriginal Land Rights (Northern Territory) Act 1976 (Cth) (ALRA), private and government owned properties and in Marine Parks), boat ramps and associated infrastructure, artificial reefs and FADs and fishing platforms. Specific societal drivers of relevance to the recreational sector that can be addressed by RD&E include: access to fishing grounds and resources including artificial reef and FADs; resource allocation (sharing); sectoral expectations; understanding and promoting the health benefits of recreational fishing; capacity building (institutional, workforce and people); and partnerships and agreements with Traditional Owners.

For the wild-catch and aquaculture sectors, the critical need is certainty so that planning and investment into the future can be done with confidence. Not only about certainty to access important commercial fishing and aquaculture areas, but it is also important that processes to reach decisions are clear, considerate and consistent.

Relevant to all sectors, the Northern Territory Animal Protection Act 2018 recently broadened the definition of 'animal' to cover all bony fish, cartilaginous fish (e.g. sharks and rays), crustaceans (e.g. crabs, lobsters and prawns) and cephalopods (squid and octopuses). This change in law has the potential to significantly impact the NT fishing and seafood industry unless Codes of Practice are updated accordingly. It will be a defence under the new Act if a person's interaction with an animal is in accordance with a prescribed Code of Practice. Commercial wild-catch, aquaculture and recreational Codes of Practice will need to be modified so that they adequately cover the capture and post-harvest requirements of the new Animal Protection Act 2018. It is not yet clear how this may impact on customary indigenous fishing practices.

5.1.3. Economic Drivers:

The fishery and aquaculture resources of the Northern Territory have tremendous economic potential for all sectors, but the vast and remote coastline of much of the NT is an impediment to their development due to lack of capital, infrastructure and suitably trained and experienced people.

Significant investment of RD&E directed specifically at development of Indigenous capacity to run, or be involved in profitable businesses associated with recreational fishing, wild-catch fisheries and aquaculture is required to overcome these hurdles. The benefits of good economies in remote Indigenous communities will also have a social benefit through community health and personal wellbeing.

The economic contributions of the recreational fishing and FTO sectors (including fishing retail and gear manufacturing) to the NT are important, and recreational fishing is a primary driver for many interstate and international visitors to the NT. The positive impacts integrate with societal drivers because of the influence that the sectors have on community and personal wellbeing. Understanding and recognition of the contribution of recreational fishing to the NT economy and in particular tourism are important components of a strategic RD&E plan. Specific economic drivers include: continued measurement and communication of economic importance by sector; and assessing potential and defining optimisation for FTOs including delivering high quality fishing experiences.

The economic contributions of the wild-catch and aquaculture sectors to the NT are important. The positive impacts integrate with societal drivers because of the influence that the sector has on community and personal wellbeing. Profitability and benefit maximisation are important components of a strategic RD&E. Markets, business opportunity and stability, as well as regulatory efficiency, all interweave to influence outcomes. Specific economic drivers include: infrastructure and infrastructure planning; assessing potential and defining optimisation; baseline measurements of economic impact by sector; market access and security; resilience and vulnerability (adaptation) to change; biosecurity, product quality and animal health; and traceability.

5.2. Meeting and survey feedback

When questioned about the FRDC priority areas, every sector placed environment as one of the highest priority areas – generally sustainability of the target species but also interactions with listed species and ecosystem impacts. Stakeholders recognise the importance of sustainability and want to ensure and demonstrate that their fishing/aquaculture activities are sustainable. In addition to the environment, commercial wild-catch placed "Industry" as their highest priority. The Indigenous priorities were "community" and "people".

Despite the above emphasis on environment and sustainability, when each sector was asked which was their "single biggest issue", those relating to "access" were rated the highest by most survey respondents in the commercial wild-catch, and recreational sectors. Access was also a significantly important issue for Indigenous people behind "commercial opportunities" and for commercial aquaculture behind "food production" and "breeding".

It was very apparent from grass roots stakeholders across all sectors that the single biggest issue currently being grappled with in Northern Territory fisheries and aquaculture is the implications of the Blue Mud Bay (BMB) High Court decision, which recognised Traditional Owners' rights to the intertidal zone on Aboriginal Land, affecting somewhere between 80-85% of the NT coastline. The practical outcome of the BMB case is that entry into waters over Aboriginal Land for a purpose such as fishing (either recreational or commercial) requires permission from the relevant land trust[6], except in areas that have entered into an agreement with the Government for open access. Whilst this decision opens the possibility of unprecedented Aboriginal control and involvement in varied marine industries and environmental and cultural conservation, it has obvious implications for access and allocation for both commercial and recreational fishers operating around the NT coast. The interim arrangements, which have waived the need for an access permit since 2008, will not continue indefinitely, and more enduring arrangements are required. This issue is the prime driver of the NT RAC's strategic RD&E directions for 2019-2024.

Although access to NT fishery and aquaculture resource is the same underlying driver, it has a range of implications for each sector.

[6] See the commentary by Lauren Butterly 'A decade on: What happened to the historic Blue Mud Bay case (and why is it in the news again)?' on AUSPUBLAW (20 June 2017) https://auspublaw.org/2017/06/what-happened-to-the-historic-blue-mud-bay-case

5.2.1. Indigenous

There is a significant immediate challenge for the Indigenous sector to introduce and manage a permit system to enable commercial and recreational access to inland and coastal waters on Aboriginal Land after interim access arrangements expire. There is obvious potential for such a system to also collect catch and effort information to assist in monitoring and management of the coastal fishery resources. As yet, it is unclear to what extent this system will integrate with that of NT fisheries Department, if at all, but it would be mutually beneficial if it did (not least to prevent duplication of reporting for commercial fishing operations). In addition to a permit system, it is likely that a significant extension project will be required to educate both commercial and recreational fishers about requirements of fishing on Aboriginal Land.

In addition to developing the permit system required to access Aboriginal Land, the NLC is managing significant investment by the Commonwealth government to support the participation of Traditional Owners in commercial fisheries and marine resource management activities. The NT Government is also exploring complimentary support and grant programs to assist Traditional Owner involvement in the seafood industry. The challenge for the Indigenous sector is developing the capacity of Indigenous people in rural areas that want to be involved in various aspects of the seafood industry and supporting them with the training and supply-chain infrastructure necessary for a successful seafood business. This presents an opportunity for the seafood industry to be involved with training and business development in remote Aboriginal communities. Constructive, mutually beneficial partnerships between the Indigenous and commercial sectors is a key to the success of such ventures.

Similarly, there is opportunity for two-way training between Fisheries Division staff and Indigenous people in the management of remote coastal fishery resources. It is expected that this would build on and expand the scope and capacity of the current Indigenous Marine Ranger program.

5.2.2. Recreational

Much of the popular coastal fishing areas area around Darwin and the van Diemen Gulf are not currently impacted by the BMB decision either because 1) they are not associated with an Aboriginal Land Trust (ALT) or 2) access to tidal waters over Aboriginal Land is still be permitted because the Northern Territory Government has entered into an Agreement with the relevant Aboriginal Land Trust. Nevertheless, the recreational sector is concerned about the implications of the BMB decision and does not want to lose access to the high-quality fishing enjoyed by thousands of locals and interstate and international tourists in other more remote areas associated with ALTs and therefore requiring permits from the end of the interim arrangements. As yet, it is too early to gauge the permit requirements that may be sought from recreational fishers and whether they may provide individual or blanket access; there will no doubt be lengthy and ongoing negotiations in this respect. Regardless, there remains the opportunity for individual recreational fishers, groups of fishers or fishing tour operators to negotiate with Indigenous communities associated with an ALT for permits and access to specific coastal fishing areas. Again, such arrangements could be mutually beneficial: potentially offering strictly controlled and high-quality fishing opportunities to recreational fishers and, in turn, a revenue stream or business opportunity to the Indigenous community who manages the area.

5.2.3. Commercial

The commercial wild-catch sector has undergone more than two decades of continually reducing access to NT coastal regions and resources as a result of spatial closures implemented variously to segregate them away from important recreational fishing areas, Aboriginal Land or Marine Protected Areas. They are now looking for greater security and certainty for the future of their seafood businesses based on NT coastal fishery resources. Lack of business certainty is a major impediment to investment in the NT commercial seafood industry. Whilst the change in permit requirements associated with the BMB decision is a challenge to the commercial fishing industry in terms of raising uncertainty about their access, it also presents an opportunity for commercial wild-catch operators to partner directly with coastal Indigenous communities to secure long-term access to specific areas of the NT coastline. Not only will this benefit commercial operators, but the TOs and Indigenous communities can benefit from additional employment opportunities associated with working in the seafood industry.

Not dissimilar to the commercial wild catch sector, there will be mutually beneficial opportunities available to the aquaculture sector through negotiating access to prime coastal regions suitable for different types of aquaculture. In fact, such arrangements have been well established for decades in both Western Australia and the Northern Territory with respect to pearl aquaculture and growout, and there is evidence of similar arrangements beginning to be negotiated for newer aquaculture ventures such as prawns, sea cucumbers, giant clams and tropical rock oysters.

5.2.4. Cross-sectoral challenges and opportunities

All sectors want catch (and effort) information at a higher spatial (and temporal) resolution to inform management controls and understand localised impacts of fishing and aquaculture. It was apparent through our discussions (not so much the survey results) that it is not sufficient to just have R&D that determines that (coastal) stocks across the NT are sustainable and that fishing has acceptable impacts on the environment. There are finer scale (spatial and temporal) stock dynamics, fishing activities and interactions between the sectors that are becoming more important. Each sector has areas of the fishery/coastline that are more important to them for social and economic reasons. For example, TOs may have areas of sacred significance where they don't want any fishing or aquaculture, but also have regions near to coastal towns or settlements that are more important to them than other areas because of ease of access to the resource. For commercial reasons, the Indigenous sector is also interested in what commercial and recreational catches are currently taken and could potentially be taken in regions associated with their particular communities. Similarly, there are areas of the coastal and inland NT that are more important to the recreational sector because of quality of fishing and ease of access, particularly around key population centres. They are concerned about the level of catch taken — particularly by the commercial sector — in these areas and its impact on recreational fishing success, or even just the amenity of recreational fishing. Finally, the commercial sector, which has already had significant closures to areas in which they can fish, is concerned about the economic impacts of being forced into areas where there are lower catch rates or where there are increased costs of catching, storing and transporting fish to their markets.

Given the above, cross-sectoral understanding of fine-scale spatial dynamics of fishing and its importance to each sector for cultural, social and economic reasons is required. Increased levels of data, particularly from the Indigenous and recreational sectors, will be required to inform these discussions.

5.3. Overarching NT RD&E plan

Based on the above and each sector's individual RD&E Plans (See Appendices 3-5 for the priority areas), an overarching RD&E Plan was developed for the Northern Territory (Appendix 6).

6. Further Development

AFANT and the NTSC were provided with their own surveys so that they themselves can easily and efficiently survey their own membership. Surveys were tailored to each sector, and contain questions that are important to those organisations, but are not necessarily relevant to the RD&E plan. An example of the NTSC survey is provided at Appendix 7.

7. Extension and Adoption

A considerable part of this work was extension through face-to-face and phone meetings with stakeholders, and through the online survey. Relevant stakeholder groups were given opportunities to review their RD&E plans individually. Comments were incorporated into plans where appropriate. Individual plans have been provided to the NT RAC and representative organisations for distribution to membership. It is up to the NT RAC to prioritise research on the goals of the RD&E plan.

8. References

AFANT. (2013). *AFANT Strategic Plan 2013*. Darwin, NT: Amateur Fishermen's Association of the NT Inc. Retrieved from http://afant.com.au/wp-content/uploads/2012/12/AFANT-Strategic-Plan-2013-final.pdf

AFMF. (2017). Australian Fisheries Management Forum National Statement of Intent on Fisheries and Aquaculture. Australian Fisheries Management Forum. Retrieved from http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/638834/AFMF-National-Statement-of-Intent.pdf

ALC. (2012). *ALC 15 year strategic plan 2012-2027*. Angurugu, N.T: Anindilyakwa Land Council. Retrieved from http://anindilyakwa.com.au/uploads/images/ALC-15-YEAR-STRATEGIC-PLAN-FINAL.pdf

Commonwealth of Australia. (2016). Success through innovation: The National Fishing and Aquaculture Research, Development and Extension Strategy

2016. Fisheries Research and Development Corporation. Retrieved from www.frdc.com.au/research/national-framework

Department of Agriculture. (2014). *Aquaplan 2014-2019: Australia's National Strategic Plan for Aquatic Animal Health.* Canberra, ACT: Commonwealth of Australia. Retrieved from http://www.agriculture.gov.au/SiteCollectionDocuments/animal-plant-health/aquatic/aquaplan-2014-2019.pdf

FRDC. (2015). The Fisheries Research and Development Corporation's Research, Development and Extension Plan 2015–20. Fisheries Research and Development Corporation. Retrieved from http://frdc.com.au/research/Documents/FRDC_RDE-Plan_2015-20.pdf

Gunn, J. (2015). *National Marine Science Plan 2015-2025: driving the development of Australia's blue economy*. National Marine Science Committee. Retrieved from http://www.marinescience.net.au/fileadmin/user_upload/documents/NMSP_TS_040116_website_update.pdf

Henry, G. W., & Lyle, J. M. (2003). *The national recreational and indigenous fishing survey* (Final Report Series No. 40) (p. 188). NSW Fisheries. Retrieved from http://frdc.com.au/research/Final_Reports/1999-158-DLD.pdf

NLC. (2016). *Northern Land Council Strategic Plan 2016 – 2020*. Darwin, NT: Northern Land Council. Retrieved from http://www.nlc.org.au/files/pdfs/NLC_Strategic_Plan_2016-2020.pdf

Northern Territory Government. (2014). *Fishery Status Reports 2012* (No. Fishery Report No. 113). Darwin NT: Northern Territory Government Department of Primary Industry and Fisheries.

NPIRDEF. (2017). National Primary Industries R, D & E Framework. Retrieved July 19, 2017, from http://www.npirdef.org/

Savage, J. (2015). *Australian fisheries and aquaculture statistics 2015* (Fisheries Research and Development Corporation project 2016-246). Canberra: ABARES. Retrieved from http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2015/AustFishAquacStats_2015_v1.0.0.pdf

West, L. D., Lyle, J. M., Matthews, S. R., Stark, K. E., & Steffe, A. S. (2012). *Survey of Recreational Fishing in the Northern Territory, 2009-10* (Fishery Report No. No. 109). Darwin, Australia: Northern Territory Government. Retrieved from https://dpir.nt.gov.au/__data/assets/pdf_file/0016/233017/fr109.pdf

Appendix 1 – Intellectual Property

No intellectual property has arisen from this project.

Appendix 2 - Staff

Name	Organisation	Project Involvement
Ian Knuckey	Fishwell Consulting	Principle Investigator
Matt Koopman	Fishwell Consulting	Researcher
Chris Calogeras	C-AID Consultants	Researcher

Appendix 3 – Indigenous fishing RD&E plan

RD&E Program1. Environment	
Priority Area 1 **Demonstrated resource sustainability** **(Goal 6)**	Outcomes: • Cost-effective harvest strategies or other appropriate mechanisms that underpin the sustainability of key species of interest to Indigenous communities; • Improved (sustainable, complementary and equitable) management arrangements across all sectors involved in NT fisheries; • Management arrangements implemented that ensure cumulative impacts of fisheries and other activities on habitats and ecosystems are sustainable.
Priority Area 2 **Fine-scale spatial information on sectoral catches, effort and "values"** **(Goals 4, 5, 6)**	Outcomes: • Improved fine-scale catch, effort and satisfaction data from all users of fishery resources to inform optimal allocation; • A GIS-based framework containing the catch, effort, "value" and other social metrics to allow managers and stakeholders to evaluate sectoral access and allocation issues and trade-offs at a local (community-based) level; • Implementation of appropriately scaled monitoring and assessments that prevent localised depletion of fisheries resources and ensure ease of access by Indigenous communities.

RD&E Program 2. Industry	
Priority Area 1 **Successful Indigenous businesses** **(Goal 1).**	Outcomes: • Established strategic business partnerships between Indigenous communities and the recreational sector (including fishing tour operators), commercial wild-catch and aquaculture sectors; • More skilled Indigenous people and communities involved in seafood and fishing businesses; • Reduced barriers to Indigenous involvement in seafood and fishing businesses; • Leadership, accountability, and extension support for Indigenous community in place.
Priority Area 2 **Improved supply chain and logistics infrastructure** **(Goals 1).**	Outcomes: • Prioritisation of infrastructure needs across the NT including roads to service fishing to key commercial and recreational fishing areas and aquaculture sites on Aboriginal Land; • Adequate infrastructure in place and seafood businesses located in remote aboriginal communities.
Priority Area 3 **Marketing of Indigenous fishing and seafood enterprises** **(Goal 1)**	Outcomes: • Established marketing program for Indigenous fishery-related businesses and products; • Established branding and recognised value of Indigenous fishery products and tourism businesses.

RD&E Program 3. Communities	
Priority Area 1 **Increase the capacity and role of Marine Ranger programs** **(Goal 2).**	Outcomes: • Increased capacity of Marine Ranger programs to monitoring and collect fishery and other relevant data; • Increased capacity of Marine Ranger programs to deliver fisheries education and extension activities in their communities and the broader NT community; • Increased involvement of Marine Rangers in FRDC fisheries related RD&E.
Priority Area 2 **Indigenous representation** **(Goal 3)**	Outcomes: • Increased capacity of Indigenous people to represent their communities in natural resource management forums. • Appropriate level of Traditional Owner and Indigenous community representation of on regional and NT fishery management groups.
Priority Area 3 **Community-based harvest strategies** **(Goal 6).**	Outcomes: • Methods to monitor and assess localised depletion of fisheries resources adjacent to Indigenous communities developed, and potential means to prevent depletion identified.
Priority 4 **Increase understanding of other fishing sectors** **(Goal 5)**	Outcomes: • Mutual understanding of the “value” each sector places on coastal and inshore fishery resources developed; • Guidelines for appropriate behaviours and access requirements in relation to Aboriginal Land and Sea Country and culturally significant places and sacred sites developed;

	• Established economic and social parameters to inform management decision-making and resource allocation across all sectors; • Access and allocation arrangements for all fishing and aquaculture sectors optimised.
Priority 5 **Health and wellbeing** **(Goal 7)**	Outcomes: • Benefits of fishing and including seafood in the diet of TO's and Indigenous communities to their health, wellbeing, social and cultural outputs documented.

RD&E Program 4. People	
Priority Area 1 **Indigenous capacity building** **(Goals 1, 2, 3)**	Outcomes: • Increased capacity of Indigenous people to represent their communities in natural resource management forums; • Increased involvement of Indigenous people in Marine Ranger programs; • Training and support provided for Indigenous people to be involved in seafood and fishing businesses; • Improved processes that enhance Marine Ranger involvement in FRDC fisheries related RD&E.
Priority Area 2 **Indigenous leadership** **(Goal 3)**	Outcomes: • Future Indigenous leaders identified and pathways for their development put in place; • Consistent Indigenous participation in national training and capacity building programs such as NSILP.

RD&E Program 5. Adoption	
Priority Area 1 **Identifying preferred and effective pathways for adoption.**	Outcomes: • Understanding of how Indigenous people seek out, evaluate, and adopt RD&E to improve operations.
Priority Area 2 **Effective processes to deliver RD&E outcomes to Indigenous communities**	Outcomes: • Culturally appropriate methods to distribute and communicate R&D outcomes to Indigenous communities; • Mechanisms identified, developed and implemented to proactively engage stakeholders.
Priority Area 3 **Set adoption and outreach targets to measure investment success**	Outcomes: • Metrics designed to measure success in awareness and implementation and/or adoption of RD&E outputs for the Indigenous sector; • Mechanisms identified, developed and implemented to improve knowledge transfer within the Indigenous sector.

Appendix 4 – Commercial fishing and Aquaculture RD&E plan

RD&E Program1. Environment	
Priority Area 1 **Demonstrated resource sustainability** **(Goals 1, 7).**	Outcomes: • Cost effective monitoring and assessment methods to determine stock status; • Implemented harvest strategies with appropriate limit and target reference points and decision rules that include commercial, recreational and Indigenous sectors; • Management arrangements in place to ensure cumulative impacts of fisheries and other activities on habitats and ecosystems are sustainable; • Address the perceptions that fisheries are overfished and not sustainable.
Priority Area 2 **Improved understanding of environmental drivers of stock abundance and the potential impacts of climate change** **(Goal 1)**	Outcomes: • Better knowledge of ecological drivers in northern Australia fishery resources; • Documented management strategies that respond to environmental condition and optimise resource use.
Priority Area 3 **Improved cost-effective management of commercial fisheries** **(Goal 1)**	Outcomes • Appropriate and cost-effective harvest strategies developed for NT commercial fisheries; • Improved (sustainable, complementary and equitable) management arrangements for the Demersal Fishery and Timor Reef Fishery targeting tropical snapper implemented.

Priority Area 4 **Fine-scale spatial information on sectoral catches, effort and "values"** **(Goals 2,7)**	Outcomes: • Fine-scale catch and effort data from all users of fishery resources collected to inform optimal allocation; • Collated detailed spatial information on the social and economic "value" of coastal resources to the different sectors; • GIS-based framework developed containing the above information to allow managers and stakeholders to evaluate sectoral access and allocation issues and trade-offs.
Priority Area 5 **Animal health and biosecurity** **(Goal 6)**	Outcomes: • Protocols in place for monitoring animal health and biosecurity for natural fisheries resources and aquaculture products.

RD&E Program 2. Industry	
Priority Area 1 **Equitable cross-sectoral access and allocation arrangements** **(Goals 3, 7)**	Outcomes: • Developed mutual understanding of the "value" each sector places on coastal resources; • Clearly articulated fishery management objectives with respect to ecosystem, social, and economic requirements; • Strategic partnerships developed between Indigenous communities and the recreational sector (including fishing tour operators), commercial wild-catch and aquaculture sectors; • Reduced inter-sectoral conflict, particularly between commercial (Barramundi) fishers and recreational fishers
Priority Area 2 **Development of Indigenous seafood businesses** **(Goal 4)**	Outcomes: • Training and support provided to Indigenous people and communities to be involved in commercial seafood businesses and recreational business ventures; • Barriers to successful Indigenous involvement in seafood / fishing businesses identified and addressed; • Improved integration of Indigenous fishing into the aquatic resource management processes.
Priority Area 3 **Security and profitability of commercial wild-catch operations** **(Goals 3, 4, 6)**	Outcomes: • Ongoing certainty of access to healthy and economically-viable commercial fishery resources; • Recognised allocation of resources to the commercial fishing sector; • Reduced WH&S risks in the workplace; • Increased value of fisheries production for the benefit of the broader community; • Differentiation of product by naming, branding and certification.

Priority Area 4 **Security and profitability of aquaculture ventures** **(Goals 3, 6)**	Outcomes: • Access to coastal areas that support aquaculture farms; • Improved nutrition, feeding strategies, health and overall husbandry techniques to increase profitability of developing aquaculture ventures; • Differentiation of product by naming, branding and certification; • Reduced WH&S risks in the workplace; • Improved disease diagnostic capabilities, surveillance programs and treatment; • Biosecurity risks quantified and safeguards developed.
Priority Area 5 **Impact of regulatory burden on industry** **(Goal 6)**	Outcomes: • Reduced impact of regulations on potential profitability of commercial fishing, FTO, aquaculture and Indigenous businesses; • Improved communication between government, Industry, and other stakeholders to ensure that Industry needs are more effectively met.

RD&E Program 3. Communities	
Priority Area 1 **Social licence to operate** **(Goals 3,7)**	Outcomes: • Updated commercial wild-catch and aquaculture Codes of Practice that align with the revised NT Animal Protection Act 2018 with regard to capture and post-harvest handling of fish, sharks, crustaceans and cephalopods; • Mutual understanding of the "value" each sector places on coastal resources; • Trust in our industry by our members, community and government; • Improved structures and processes for NTSC; • Strategic alliances and partnerships developed between commercial wild-catch and aquaculture sectors and other stakeholders; • Reduced conflict between the commercial wild-catch (especially Barramundi) fishers and recreational fishers.
Priority Area 2 **Economic development of remote Aboriginal communities** **(Goals 2, 4)**	Outcomes: • Training and support provided to Indigenous people and communities to be involved in commercial seafood businesses; • Culturally appropriate methods to capture data implemented.
Priority Area 3 **Marine Ranger programs** **(Goal 5)**	Outcomes: • Commercial sector assistance and support for monitoring and compliance capability of community-based Indigenous Ranger programs implemented.

RD&E Program 4. People	
Priority Area 1 **Capacity building** **(Goals 3, 4, 6, 7)**	Outcomes: • A skilled workforce developed and maintained across all parts of the Northern Territory fisheries and aquaculture sectors; • RD&E projects implemented that build and introduce research and extension capacity to the NTSC; • Increased understanding of the fundamentals of fisheries management and operations; • Critical gaps in existing workforce capability identify and options to address prioritised; • Training and succession planning of Licensee Committees, Group Committees and NTSC Board implemented.
Priority Area 2 **Industry leadership** **(Goals 3 & 4).**	Outcomes: • Future leaders identified and pathways for their development put in place; • Local cross-sectoral training and network provided for better mutual respect and collaboration; • Leadership retention and skill diversification strategies established; • Consistent NT participation in national training and capacity building programs such as NSILP.

RD&E Program 5. Adoption	
Priority Area 1. Identifying preferred and effective pathways for adoption.	Outcomes: • Sector-specific understanding of how operators seek out, evaluate, and adopt RD&E to improve operations; • Strategic determination of periodicity of adoption cycles to allow extension planning to meet temporal needs/patterns; • NTRAC extension plan in place and performance measured against identified stakeholder needs.
Priority Area 2. Effective processes to deliver research outcomes to end-users and broader community	Outcomes: • Advice in place regarding the use of various communications strategies (including social media) to distribute R&D outcomes; • Mechanisms identified, developed and implemented to proactively engage stakeholders; • Stakeholder forums in place to engage end users in technological advancements and innovative solutions to shared problems.
Priority Area 3. Set adoption and outreach targets to measure investment success	Outcomes: • Metrics designed to measure success in awareness and implementation and/or adoption of research outputs; • Mechanisms identified, developed and implemented to improve knowledge transfer within and among sectors; • Internal data collection and assessment systems established to measure levels of extension from NTRAC supported research.

Appendix 5 – Recreational fisheries RD&E plan

RD&E Program1. Environment	
Priority Area 1 **Demonstrated resource sustainability** **(Goal 2)**	Outcomes: • Cost effective monitoring and assessment to determine stock status of key target species; • Improved recreational catch controls that align with the harvest strategies of key species (with appropriate limit and target reference points and decision rules); • Management arrangements implemented that ensure cumulative impacts of fisheries and other activities on habitats and ecosystems are sustainable.
Priority Area 2 **Post release mortality** **(Goal 2)**	Outcomes: • Increased recreational fisher understanding of post-release mortality, and demonstrated techniques to reduce post-release mortality; • Safer best practice release techniques with respect to dangers of crocodile and shark attack.
Priority Area 3 **Fine-scale spatial information on sectoral catches, effort and "values"** **(Goals 1, 2, 3 and 5).**	Outcomes: • Improved fine-scale catch, effort and satisfaction data from all users of fishery resources to inform optimal allocation; • Increased capacity for collection of data by recreational fishers; • An understanding of appropriate scale on which to manage fisheries and of appropriate structures to implement that management; • Detailed spatial information on the social and economic "value" of coastal resources to the different sectors; • Continued time series of tagging, angler diary and recreational catch and effort data;

	• GIS-based framework containing the above information to allow managers and stakeholders to evaluate sectoral access and allocation issues and trade-offs.
Priority Area 4 **Reduce illegal trade of Black Jewfish swim bladders** **(Goal 4)**	Outcomes: • Reduced incidence of illegal capture of Black Jewfish for the swim bladder trade

RD&E Program 2. Industry	
Priority Area 1 **Equitable cross-sectoral access and allocation arrangements** **(Goal 1, 6)**	Outcomes: • Shared mutual understanding of the "value" each sector places on coastal resources; • Fair and equitable resource access and allocation between sectors allocation • Clearly articulated fishery management objectives with respect to ecosystem, social, and economic requirements; • Established strategic partnerships between Indigenous communities and the recreational sector (including fishing tour operators), commercial wild-catch and aquaculture sectors; • Reduced inter-sectoral conflict, particularly between commercial (Barramundi) fishers and recreational fishers.
Priority Area 2 **Secure long-term access to fishing grounds** **(Goals 1, 3 and 4)**	Outcomes: • Prioritisation of infrastructure needs across the NT including roads to key fishing areas, boat ramps and boat ramp facilities including security; • An understanding of the effectiveness of fisheries enhancement program that informs strategic development. • Improved behaviours in relation to access to culturally significant, Aboriginal Land and private and government owned land.
Priority Area 3 **Security and profitability of FTOs** **(Goal 5)**	Outcomes: • Improved level of service of FTOs by developing a minimum standard; • Increased promotion of FTO fishing opportunities interstate and overseas; • More efficiently ran FTO businesses; • A strategic plan to improve the FTO industry.

RD&E Program 3. Communities	
Priority Area 1 **Social licence to operate** **(Goals1, 3, 4, 5 and 6)**	Outcomes: • Behaviour that complies with the Animal Protection Act 2018 with regard to capture and handling of fish, sharks, crustaceans and cephalopods; • Mutual understanding of the "value" each sector places on coastal and inshore resources developed; • Effective engagement with government and other groups related to or that can impact on fishing; • Improved structures and processes for NTGFIA; • Wider awareness of wellbeing and economic benefits of recreational fishing; • Increased information available on compliance activity and breaches and increase compliance in areas of high non-compliance; • Reduced conflict between the commercial wild-catch (especially Barramundi) fishers and recreational fishers; • Increased compliance of legislation including that aimed at managing social and cultural objectives.
Priority Area 2 **Maintain access to fishing grounds** **(Goals 1, 3 and 4)**	Outcomes: • Increased understanding of access requirements and appropriate behaviours on designated culturally significant sites and Aboriginal Land, private and government land; • Improved cross-sectoral relationships and increased opportunities for partnerships in local management; • A developed framework and capacity to identify and progress issues of mutual concern between sectors.

RD&E Program 4. People	
Priority Area 1 **Capacity building** **(Goals 5 and 6)**	Outcomes: • Increased capacity of AFANT and NTGFIA executives, committee and members; • Developed pathway for succession of AFANT and NTGFIA executives and committee; • Enhanced capacity to engage on environmental issues.
Priority Area 2 **Industry leadership** **(Goal 5)**	Outcomes: • Future leaders identified and pathways and regular opportunities for their development put in place; • Consistent NT participation in national training and capacity building programs such as NSILP; • Increase participation by AFANT in partnering in RD&E projects; • Regular attendance at the 3 yearly World Fisheries Conference.
Priority Area 3 **Safety** **(Goal 2)**	Outcomes: • Safer best practice release techniques use with respect to dangers of crocodile and shark attack.
Priority Area 4 **Quality of experience** **(Goal 3).**	Outcomes: • Informed management of social aspects of recreational fishing.

RD&E Program 5. Adoption	
Priority Area 1 **Identifying preferred and effective pathways for adoption.**	Outcomes: • Sector-specific understanding of how operators seek out, evaluate, and adopt RD&E to improve operations; • Strategic determination of periodicity of adoption cycles to allow extension planning to meet temporal needs/patterns; • NTGFIA minimum standards in place and performance measured against defined reference points.
Priority Area 2 **Effective processes to deliver research outcomes to end-users and broader community**	Outcomes: • Advice and capacity in place regarding the use of various communications strategies (including social media) to distribute R&D outcomes; • Mechanisms identified, developed and implemented to proactively engage stakeholders; • Stakeholder communication in place to increase awareness of methods to reduce post release mortality; • Improved understanding of messaging to meet community expectations.
Priority Area 3 **Set adoption and outreach targets to measure investment success**	Outcomes: • Metrics designed to measure success in awareness and implementation and/or adoption of research outputs; • Mechanisms identified, developed and implemented to improve knowledge transfer within the recreational sector; • Internal data collection and assessment systems established to measure levels of extension from AFANT and NTGFIA supported research.

Appendix 6 – Overarching NT RD&E plan

The Northern Territory Research Advisory Committee RD&E Plan provides a framework to identify the key strategic research needs of the fisheries sector under its jurisdiction from 2019 – 2024.

NT Research Advisory Committee RD&E Plan

Research, Development and Extension Plan 2019 – 2024

TABLE OF CONTENTS

1 CONTEXT

1.1 FRDC

The Fisheries Research and Development Corporation (FRDC) is a co-funded partnership between its two stakeholders, the Australian Government and the fishing industry: commercial (wild catch and aquaculture), recreational and Indigenous. The FRDC's role is to plan and invest in fisheries research, development and extension (RD&E) activities in Australia. This includes providing leadership and coordination of the monitoring, evaluating and reporting on RD&E activities, facilitating dissemination, extension and commercialisation. This is achieved through coordinating government and industry investment, to establish and address RD&E priorities.

FRDC investment is overseen by the following guiding principles:

- maximise efficiency and effectiveness
- avoid duplication
- minimise administration costs
- provide for flexibility
- maximise opportunities for collaboration, leverage opportunities and create value
- encourage the generation of novel and innovative ideas.

The FRDC research, development and extension plan (2015-20) outlines a significant change in the way the FRDC will plan and invest in RD&E for fishing and aquaculture over the next five years. Of note is the transition from being essentially a fund granting body to one that adds value and strategic focus to RD&E for the Australian fishing and aquaculture industry. The 5-year RD&E Plan has been developed through a comprehensive process of assessing the operating environment for fishing and aquaculture, consultation, analysis and consideration.

1.2 FRDC RD&E Investment Programs

The FRDC has five Research, Development and Extension (RD&E) investment programs that directly align with its governing legislation, the Primary Industries Research and Development Act 1989 (PIRD Act)[1]. RD&E investments across these program areas will be assessed to ensure the FRDC maintains a balanced portfolio that meets the short and long term needs of its stakeholders, including the Australian Government and the Australian community. The programs include:

Environment

This program relates to RD&E that supports natural resource sustainability in managing fishing and aquaculture activities in Commonwealth, state and territory waters. Many components of FRDC-funded RD&E focus on improving the sustainable use of Australia's aquatic resources.

Industry

This program relates to RD&E that assists the production and value of seafood. It could be in the form of business profitability, international competitiveness, opportunities for productivity increases, resource access, and experience or wellbeing benefits. This program aims to help all sectors improve their overall performance.

[1] Primary Industries Research and Development Act 1989. No. 17, 1990 as amended. https://www.legislation.gov.au/Details/C2014C00033

Communities

This program relates to RD&E that maintains the long-term sustainability of the commercial sector by understanding the interactions and co-dependence between fishing and aquaculture, and the wider community. It is enhanced by knowledge about the social importance of fisheries.

People

This program relates to RD&E that is needed to attract and advance people who will lead fishing and aquaculture towards a sustainable and profitable future. The FRDC has taken a strong role in this area, from employing and developing young researchers, through to facilitating access to leadership development for all sectors of fishing and aquaculture.

Adoption

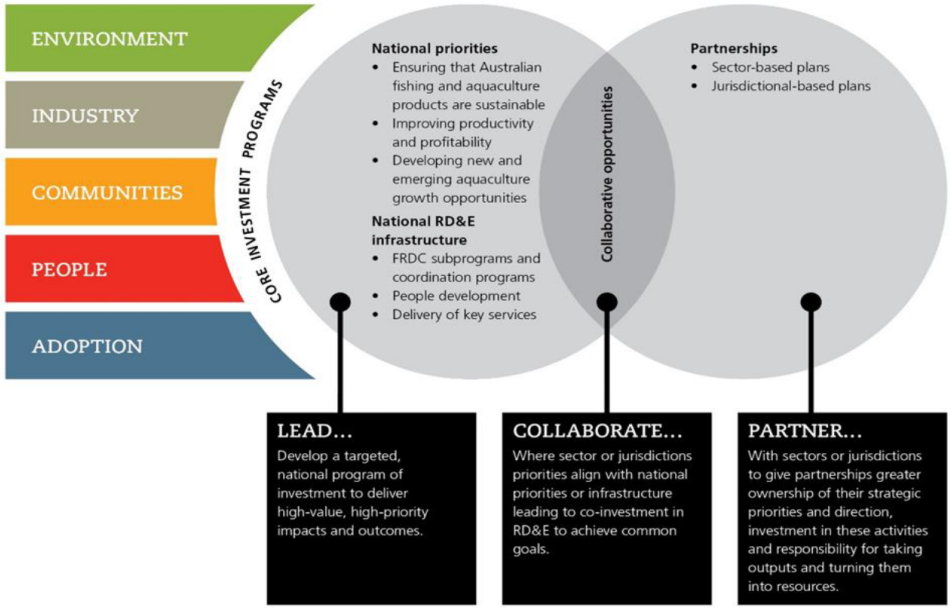
This program relates to how project outputs are delivered so they can be easily adopted and support stakeholder decision making and practices. The FRDC continually works with researchers and end users to determine and implement the best way of extending these results. In addition, the FRDC is continuing to develop its systems to ensure its 'knowledge bank' is widely accessible.

1.3 Co-management investment model

Under the FRDC's RD&E Plan 2015 - 2020, the FRDC provides greater ownership and authority to industry sectors in developing RD&E priorities, through Industry Partnership Agreements (IPAs) and to jurisdictions through Research Advisory Committees (RACs) - formerly Fisheries Research Advisory Bodies (FRABs).

A key component of this investment model is the development of a multi-year RD&E Plan for each IPA and RAC aligned with the FRDC's 5-year RD&E Plan. This will assist in developing a tailored RD&E program that:

- meets both jurisdictional and national strategic RD&E priorities
- is balanced across FRDC programs (environment, industry, communities, people and extension)
- focusses on short, medium and longer term RD&E outcomes
- is supported by a consistent RD&E planning framework across all RACs.



1.4 Northern Territory Research Advisory Committee

Responsibility to our stakeholders

The Northern Territory Research Advisory Committee (NTRAC) works on behalf of a diverse and important set of local stakeholders that includes:

- Aboriginal communities;
- the commercial seafood industry;
- the recreational and tourism fishing sector;
- the Northern Territory Government;
- the broader community that has in interest in the services provided by, as well as the integrity of, the Northern Territory's aquatic environments.

Nationally, we have responsibility to a core set of stakeholders that include the commercial fisheries, aquaculture, Indigenous and seafood management sectors as well as the FRDC Board, various FRDC partner groups and the wider research community. The IPAs associated with NT RAC include: Australian Barramundi Farmers' Association IPA; Australian Prawn Farmers' Association IPA and Pearl Consortium IPA. Where the NT Research Advisory Committee strategic investments are placed has the potential to influence and shape national directions. We recognise that our strategic planning processes need to integrate with higher level plans whilst pursuing priority issues on behalf of the Northern Territory.

NT RAC committee members are selected based on expertise, ensuring wide stakeholder representation. Our key points of contact with our stakeholders include the Indigenous Land Councils, the Amateur Fishermen's Association of the Northern Territory (AFANT), the Northern Territory Seafood Council (NTSC), the Northern Territory Guided Fishing Industry Association and Northern Territory Fisheries research and management teams. Specific to effective service to these stakeholders, the NT RAC regards the following as important operational drivers against which our performance should be measured:

- Responsiveness to need;
- Capacity building;
- Balanced investment portfolio;
- Investment in novel and innovative opportunities;
- Collaboration with other partner groups and research initiatives; and,
- Direct adoption and implementation of research outcomes thus driving change.

We expect our stakeholders to hold us to account and our performance review mechanisms will reflect this. How we engage with our stakeholders will define how well we can advise decision-makers about strategic RD&E investment. How we promote the work we are doing will influence adoption of project outcomes. Communications planning is thus a critical component of our planning processes.

Partnerships

The Northern Territory is a small community with limited capacity to cover diverse and complex RD&E priorities. We need to be clever in what we choose to take a lead in and what expertise we lever into the Northern Territory. Criteria for successful RD&E project development will include collaboration and contribution to the Northern Territory's research capacity. Initiatives that partner directly with user groups to maintain a strong focus on end user needs are essential.

We will actively seek to build partnerships with our local and regional research community and research providers that bring complementary skills to the Northern Territory. Equivalents such as the other FRDC RACs are also important partners. A large part of our success will depend on how well we identify, and partner with other research initiatives and programs additional to FRDC various partner groups including the National Environmental Science Program (NESP), Natural Resource Management (NRM), Developing

Northern Australia and Australian Centre for International Agricultural Research (ACIAR) initiatives. As such, we invite and encourage direct dialogue to stimulate greater research investment coordination.

A Memorandum of Understanding exists between Western Australia, Queensland and the Northern Territory to share and collaborate in the fisheries research space across northern Australia. The NT RAC actively encourages that relationship to continue by seeking to collaborate on priorities and co-invest in projects that address regional issues.

Consultation process

A 5-year RD&E Plan is a major strategic need of NT fisheries and aquaculture, but the diversity and geographical separation of the various sectors (Indigenous, recreational, commercial wild-catch and aquaculture) and their wide stakeholder bases, limits the sectors' capacity to undertake the necessary grass-roots consultation and compile the required information to successfully develop such a plan. The NTRAC sought to address this problem by appointing Fishwell Consulting to engage comprehensively with a wide range of stakeholders and user groups in the NT to identify RD&E priorities and gaps, and define areas of appropriate research for each major sector as part of developing the overall NT RD&E Strategic Plan. Further, the NT RAC sought to develop a cost effective, consistent, transparent and repeatable method that can be used to update each sectors' RD&E Plans and the NT Plan over time. A range of face-to-face meetings, workshops and 5 sector-based online survey were used to obtain RD&E issues and priorities from the stakeholders. These activities were conducted under project 2016-116: Development of a 5-year sector and NT Strategic Research, Development and Extension (RD&E) Plan for Northern Territory fisheries and aquaculture based on priority needs of major stakeholder sectors (https://www.frdc.com.au/project/2016-116)

2 OPERATING ENVIRONMENT

All forms of day-to-day fishing and aquaculture in the Northern Territory are regulated under the Northern Territory Fisheries Act 1988. Like most contemporary fisheries legislation, the NT Fisheries Act 1988 sets out objectives tied to sustainability, equity and optimal resource use from the perspective of maximising benefits to the NT community at large. Research, development and extension activities that are driven by sustainability and that illuminate the social and economic components of equitable and optimal use are critical to our current and future prosperity.

2.1 Overview

Indigenous

The relationship between Aboriginal people and the NT coastline dates back more than 50,000 years. Their historic cultural and spiritual connection to Land and Sea Country is recognised under the NT Fisheries Act 1988 as is their right to continue traditional fishing practices which includes customary, commercial, aquacultural and recreational activities that incorporates management.

Many marine and freshwater species are totemic for NT coastal Aboriginal groups who continue to practise customary management and education relating to the sea that has been passed on through generations in stories, dance, song, art and ceremony. Fishing by Traditional Owners in the Northern Territory mostly takes place in inshore coastal waters, rivers and freshwater water bodies, with about two thirds of all fishing being in saltwater.

Most Traditional cultural fishing takes place using baited line methods, hand collection, spears and cast nets, and vast majority of fishing is done from the shore (as opposed to by boat, although many Indigenous people

own and fish from vessels). Most popular catch by number is molluscs (mostly mussels and other bivalves), finfish (mostly mullet and catfish) and crabs and lobster (mostly mud crabs)[2]. Traditional cultural fishing remains an important part of daily life in the Northern Territory but contemporary involvement of Indigenous people in NT fisheries is not just restricted to traditional fishing, it encompasses commercial wild-catch, commercial aquaculture and recreational fishing sectors.

While there is no single Indigenous entity overseeing Indigenous fishing and fisheries, there are four regional Land Councils in the Northern Territory: the Northern Land Council (NLC) covering the Top End; the Anindilyakwa Land Council (ALC) covering Groote Eylandt in the Gulf of Carpentaria; the Tiwi Land Council (TLC) covering Bathurst and Melville Islands; and, the Central Land Council (CLC) in the southern half of the Northern Territory. The first three are heavily involved in Sea Country rights and the management of Sea Country. The Central Land Council is more involved in Freshwater Country. As mentioned previously, separate from the Land Councils, the North Australian Indigenous Land and Sea Management Alliance Ltd (NAILSMA) assists Indigenous Land and sea managers and Traditional Owners across northern Australia to engage in the market economy and to value and strengthen their own cultural values, beliefs and practices.

Indigenous people are involved in a number of NT commercial fishing license ventures either directly or indirectly through their communities. In the near future, it is likely that there will be a greater involvement of Indigenous people in commercial fishing following financial support provided by the Commonwealth government through the NLC to support Aboriginal participation in the seafood industry. The NT Government is also exploring complimentary support and grant programs to assist Traditional Owner involvement in the seafood industry.

Whilst not strictly commercial licences under NT legislation, Aboriginal Coastal licences (ACLs) are available to Aboriginal people living full time in Aboriginal communities to provide a "start-up" opportunity for economic development and sustainable commercial activities in coastal Aboriginal communities. An ACL allows the licence holder to catch fish near their community. Catches of up to 5t per year may be sold but important commercial species such as barramundi, king threadfin salmon, Spanish mackerel, trepang and mud crab may not be targeted. Allowable fishing gears include: up to 100 m of net with mesh size up to 65 mm; hand spear, scoop net; vertical line as handline or rod and real; and a traditional fish trap. Licence holders must submit a monthly log sheet detailing what and how many fish were caught and how much was sold, and must not fish in reef protection zones, set nets across rivers or fish in sacred sites. The ACL is viewed as a potential pathway for Indigenous individuals/communities stepping into the ownership and operation of full commercial fishing licences.

Aboriginal aquaculture development is being supported through research projects focusing on low technology, sea-based methods and involving several communities across the NT. The Darwin Aquaculture Centre (DAC) and its partner organisations have worked together with the Warruwi community on South Goulburn Island and the Pirlangimpi community on the Tiwi Islands to conduct black-lipped rock oyster trials. This has involved establishing small scale oyster farming systems (long lines) to provide community members with experience in culturing oysters. Local people maintain the oyster production trials and monitoring water quality, growth and survival of farmed oysters. There has been considerable interest from communities across the NT to participate in this research and eventually establish their own oyster farms.

Another significant and expanding area of involvement of Indigenous people in NT fisheries is through the 16 Marine/Sea Ranger groups supported by the various Land Councils, as well as the Commowealth

[2] Henry, GW and Lyle, JM. (2003). The National Recreational and Indigenous Fishing survey. NSW Fisheries Final Report Series No. 48. FRDC Project No. 99/158.

Government. Half also receive funding from the NT Fisheries Division. These Sea Ranger Programs assist with local monitoring and surveillance of coastal waters but are playing an increasing role in extension and education to both Indigenous and non-Indigenous Fishers, as well as providing a visual presence on the water.

The NT Fisheries Division's recent strategic priorities for Indigenous fisheries development are:

- Partner with Aboriginal communities to deliver economic development;
- Provide technical advice and assist training and skill development in the seafood industry;
- involve aboriginal communities in fisheries management;
- protect customary fishing rights;
- recognise customary management of coastal and marine areas; and,
- support the NT's Indigenous marine rangers.

Notwithstanding the above, of greatest significance to future Indigenous involvement in NT fisheries and aquaculture are the implications of the 2008 Blue Mud Bay (BMB) High Court decision, which recognised Traditional Owners' rights to the intertidal zone on Aboriginal Land, affecting somewhere between 80-85% of the NT coastline. Subsequently, permission to access tidal waters over Aboriginal Land will be mandatory in accordance with the requirements of the Aboriginal Land Rights (Northern Territory) Act 1976 (Cth) (ALRA), except in areas that have entered into an agreement with the Government for open access. The agreements for this access are still under negotiation by stakeholder groups, the NTG and the Land Councils. Although this has raised significant concerns regarding future access arrangements for both commercial and recreational fishers, Indigenous people are exploring the significant economic and community development opportunities that may result from working constructively with both of these sectors in these regions. Capacity building, people development and projects to put in place the fundamentals of fishing businesses represent both a challenge and an opportunity for remote Indigenous communities.

Recreational and Fishing Tour Operators

Recreational fishing is an important pastime for many NT residents and a major tourism drawcard for interstate and international visitors. The high standard of the NT's recreational fishery is attributed to its largely un-spoiled environment, the number of recreationally-significant fish and marine species available and their abundance in particular areas.

Recreational fishing is an intrinsic part of the NT lifestyle with more boat ownership per capita than other parts of Australia. Fishing is a strong tourism draw card and a valuable economic contributor to our economy. Staying attractive as a tourism destination means protecting the Northern Territory's wilderness fishing and high quality sports species branding. Annual expenditure by recreational fishers and the guided fishing industry is estimated at over $100 million.

Recreational angling is generally categorised into "barramundi fishing" and "blue water fishing", with the latter further divided into reef-fishing, pelagic fishing, game fishing for trophy fish and sports fishing with lures, soft plastics and flies. Mud crab fishing with traps and dillies is also a popular pastime amongst locals. The majority of recreational fishing effort occurs in coastal areas, and almost one third occurs in and around Darwin Harbour.

The Amateur Fishermen's Association of the Northern Territory (AFANT) is the peak body for recreational fishing and there are at least 15 registered fishing clubs around the NT (Groote Eylandt Game and Sportfishing Club, Darwin Game Fishing Club, Darwin FlyRodders, Nhulunbuy Regional Sports Fishing Club, Katherine Game Fishing Club, Palmerston Game Fishing Club, Wagait Beach Fishing Club, RAAF Darwin Fishing Club, RAAF Tindal Fishing Club, King Ash Bay Fishing Club, Dundee Social & Recreation Club, NT Dolphins Spearfishing Club, Alligator Fishing Club Inc. and Darwin Trailer Boat Club). AFANT estimates there

is over 30,000 non-aboriginal recreational fishers in the NT with a direct expenditure of around $100 million annually. An overriding objective of AFANT is to ensure that the NT's world-class recreational fishery is nurtured and protected for current and future generations of Territory and visiting fishers.

Apart from its role to represent and advocate for the interests of recreational fishers in the NT and provide advice to governments and other stakeholders, AFANT (2013) recognises the following key strategic areas for NT recreational fishing:

- Protect and enhance the quality of the NT fishing experiences;
- Maintain and where possible improve recreational fishing access;
- Promote ethical, sustainable, safe and legal fishing practices;
- Participate in the management of recreational and other fisheries;
- Liaise constructively with other fishing sectors on matters of mutual interest;
- Support and participate in fisheries research; and,
- Promote the protection of the environment related to recreational fishing.

FTOs are an important component of fishery tourism running guided tours and boat hire businesses. There are 134 FTO licences in the NT, held by 91 licencees, although about half of those licences are inactive. While FTOs require a licence to operate, their customers are subject to recreational fishing regulations.

FTOs are represented by the NTGFIA. NTGFIA's objectives are to:

- Promote, develop and maintain the Guided Fishing Industry in the Northern Territory;
- Assist the Northern Territory Government in managing the Guided Fishing Industry to ensure and enhance its economic viability and the sustainability of its target species; and,
- Take a proactive role in maintaining the quality of marine and freshwater fish habitats and of the environment generally.

Commercial wild-catch and aquaculture

The Northern Territory seafood industry has more than 200 commercial fishing licences and 190 registered fishing vessels operating in 17 different wild-catch fisheries and aquaculture operations. Some operate in coastal waters (Barramundi Fishery, Mud Crab Fishery, Coastal Line Fishery, Coastal Net Fishery, Trepang Fishery, Aquarium Fishery and pearl and non-pearl aquaculture) while others operate well offshore (Demersal Fishery; Timor Reef fishery, Offshore Net and Line Fishery, Spanish Mackerel Fishery). Commercial fisheries and aquaculture product is worth $60 million annually with about $35 million attributed to the wild-catch sector. The economic significance of the seafood industry is greater than just the landed value of the catch however, seafood wholesalers, processors, transporters and retailers all contribute millions of dollars annually to the Northern Territory's economy.

NT commercial fisheries and aquaculture ventures operate in remote tropical areas where they are often challenged by a lack of infrastructure, access to only basic services, and difficulties obtaining skilled labour, all of which can limit potential without direct planning. Further, the distance from major markets can put upward pressure on living and business costs and regulatory overburden and investment certainty are persistently stated points of concern for the seafood industry.

Commercial wild-catch fishing ventures typically supply relatively low volumes of high value seafood product (comprised of mackerel, Goldband Snapper, Mud Crabs, Barramundi and numerous tropical species of Snapper) to local, national and international markets and restaurants. Six species account for 50% of the total value of the wild-catch fisheries.

All commercial fishing activities in the Northern Territory are regulated under the Northern Territory Fisheries Act, which was updated in 2016. Like most contemporary fisheries legislation, the NT Fisheries Act 1988 sets out objectives tied to sustainability, equity and optimal resource use from the perspective of maximising benefits to the NT community at large. Research, development and extension activities that are driven by sustainability and that illuminate the social and economic components of equitable and optimal use are critical to our current and future prosperity.

Aquaculture continues to emerge as an important industry in the NT. Pearling is an established leader in the region and makes substantial social and economic contributions to the NT. Cultured barramundi production has been very successful and the volume of production is continuing to increase dramatically. There are also significant proposals to develop a large-scale prawn aquaculture in the Northern Territory. New and innovative aquaculture projects have recently developed in partnership with local companies and remote Aboriginal communities. Advances in culture methods for sea cucumbers, giant clams and black-lipped rock oyster have been encouraging, with pilot studies underway at Goulburn Island and the Tiwi Islands.

The Peak industry body for NT commercial aquaculture and wild-catch fisheries is the Northern Territory Seafood Council (NTSC). The Council is an incorporated association that represent the NT seafood industry's interests in a diverse range of forums in the NT and at a national level. The NTSC has a Board of Directors that is comprised of a Chairman, Vice Chairman, Secretary, Treasurer, a CEO and a representative of each of the Licensee Committees: Aquaculture, non-pearl; Aquaculture, pearl; Aquarium Fishery; Barramundi Fishery; Coastal Line Fishery; Coastal Net Fishery; Demersal Fishery; Mud Crab Fishery; Offshore Net and Line Fishery; Spanish Mackerel Fishery; Trader/Processor Sector; Timor Reef; and, Trepang Fishery. All commercial seafood industry Licence holders are eligible for full NT Seafood Council membership.

The NTSC vision is that the "Northern Territory seafood industry is a trusted, stable and prosperous industry which is continually earning its social licence to operate". Their objectives are:

- To promote, encourage and assist the Northern Territory's commercial seafood industry and persons and groups involved in it;
- To promote, engage in, encourage and assist research, conservation and other activities beneficial to the interests, persons and groups of the Northern Territory commercial seafood industry generally; and,
- The promotion of the development of the Northern Territory's fishing and aquaculture resources.

The NTSC has developed a strategic plan to meet these objectives and ultimately achieve their vision. This Plan recognises that "future proofing" the NT commercial fisheries is a key strategic requirement and has focussed on three key pillars to build its "social licence to operate":

1. Improving structures for an effective NT Seafood Council
   Improve NTSC Board governance and capacity in agreement making and sharing control with members so that the NTSC acts as a collective in addressing the longer term, complex risks for the organisation;
2. Building trust in our industry between our members, community and government
   Improve stakeholder communication and engagement and in particular, involve Aboriginal communities in the fisheries and to deliver regionally dispersed economic benefits; and,
3. Demonstrating sustainability
   Lead innovative projects to demonstrate that sustainability challenges can be resolved in a way that secures fishing grounds through better understanding of supply chains and the investment points needed to improve fish quality and supply.

Although the first of these pillars does not necessarily require an RD&E component, the second two can definitely benefit from RD&E, particularly the extension component.

2.2 Drivers

Environmental Drivers:

Sustainable resource use is a clear driver for all fishing and aquaculture nationally and it is a priority area for RD&E in the Northern Territory. Being able to assess the status of stocks and to guide use that is consistent with long term ecosystem sustainability depends on RD&E that can elicit better (and more affordable) methods to understand sustainability, often in a data poor and/or capacity-limited operating environment. The environmental drivers that we recognise as shaping our research priorities include: sustainability of target species, bycatch and threatened species; impacts on habitat; post-release mortality; biosecurity, ecosystem integrity and climate change. Notwithstanding of the overall state of NT fishery stocks and the broader ecosystem, all sectors are particularly interested in ensuring the resources within their areas of interest are sufficiently healthy to support the various needs and values that exist at a local scale.

Societal Drivers:

Fisheries are a public resource, that can enable a public good, and how resources are used needs to be framed according to community expectation and issues of fairness and equity. Territorians have varied expectations regarding the use of aquatic resources which reflect diverse cultural, social and economic backgrounds and environmental opinions. A clear understanding of these expectations needs to inform how the optimal and equitable use of our resources is defined. The quality of fishing experiences is affected by a diverse range of real or perceived issues that can include impacts to shared resources and visual amenity associated with sharing fishing grounds with other sectors.

The sea is an inseparable part of Aboriginal 'Country' and identity. All of the Land Councils recognise the societal value of Freshwater and Saltwater Country to their communities. Continued and ongoing access to this aspect of Country is critical to individual fishers and broader Indigenous communities, not just for food and economic wellbeing, but because it incorporates spiritual beings and sacred sites that are fundamental to Aboriginal understandings of creation, ceremony and religion. It represents a continuum between Aboriginal culture in the distant past and contemporary coastal Aboriginal societies[3]. It is critical that other sectors recognise this special connection of Indigenous people with Land and Sea Country.

Specific Indigenous societal drivers that can be addressed by RD&E include: definition and recognition of specific totems and sacred sites on sea country, recognising differing sectoral expectations and values; access to fishing grounds and resource allocation (sharing); capacity building of Indigenous people to work in fisheries-related fields; and partnerships and agreements with Traditional Owners.

It is important that recreational fishers and FTOs maintain access to fishing grounds. This encompasses entry to fishing locations (through the Aboriginal Land Rights (Northern Territory) Act 1976 (Cth) (ALRA), private and government owned properties and in Marine Parks), boat ramps and associated infrastructure, artificial reefs and FADs and fishing platforms. Specific societal drivers of relevance to the recreational sector that can be addressed by RD&E include: access to fishing grounds and resources including artificial reef and FADs; resource allocation (sharing); sectoral expectations; understanding and promoting the health benefits of

[3] Living on Saltwater Country. Review of literature about Aboriginal rights, use, management and interests in northern Australian marine environments. National Oceans Office, 2004.

recreational fishing; capacity building (institutional, workforce and people); and partnerships and agreements with Traditional Owners.

For the wild-catch and aquaculture sectors, the critical need is certainty so that planning and investment into the future can be done with confidence. Not only about certainty to access important commercial fishing and aquaculture areas, but it is also important that processes to reach decisions are clear, considerate and consistent.

Relevant to all sectors, the Northern Territory Animal Protection Act 2018 recently broadened the definition of 'animal' to cover all bony fish, cartilaginous fish (e.g. sharks and rays), crustaceans (e.g. crabs, lobsters and prawns) and cephalopods (squid and octopuses). This change in law has the potential to significantly impact the NT fishing and seafood industry unless Codes of Practice are updated accordingly. It will be a defence under the new Act if a person's interaction with an animal is in accordance with a prescribed Code of Practice. Commercial wild-catch, aquaculture and recreational Codes of Practice will need to be modified so that they adequately cover the capture and post-harvest requirements of the new Animal Protection Act 2018. It is not yet clear how this may impact on customary indigenous fishing practices.

Economic Drivers:

The fishery and aquaculture resources of the Northern Territory have tremendous economic potential for all sectors, but the vast and remote coastline of much of the NT is an impediment to their development due to lack of capital, infrastructure and suitably trained and experienced people.

Significant investment of RD&E directed specifically at development of Indigenous capacity to run, or be involved in profitable businesses associated with recreational fishing, wild-catch fisheries and aquaculture is required to overcome these hurdles. The benefits of good economies in remote Indigenous communities will also have a social benefit through community health and personal wellbeing.

The economic contributions of the recreational fishing and FTO sectors (including fishing retail and gear manufacturing) to the NT are important, and recreational fishing is a primary driver for many interstate and international visitors to the NT. The positive impacts integrate with societal drivers because of the influence that the sectors have on community and personal wellbeing. Understanding and recognition of the contribution of recreational fishing to the NT economy and in particular tourism are important components of a strategic RD&E plan. Specific economic drivers include: continued measurement and communication of economic importance by sector; and assessing potential and defining optimisation for FTOs including delivering high quality fishing experiences.

The economic contributions of the wild-catch and aquaculture sectors to the NT are important. The positive impacts integrate with societal drivers because of the influence that the sector has on community and personal wellbeing. Profitability and benefit maximisation are important components of a strategic RD&E. Markets, business opportunity and stability, as well as regulatory efficiency, all interweave to influence outcomes. Specific economic drivers include: infrastructure and infrastructure planning; assessing potential and defining optimisation; baseline measurements of economic impact by sector; market access and security; resilience and vulnerability (adaptation) to change; biosecurity, product quality and animal health; and traceability.

Meeting and survey feedback

As part of the consulation process that occurred under 2016-116, when questioned about the FRDC priority areas, every sector placed environment as one of the highest priority areas – generally sustainability of the target species but also interactions with listed species and ecosystem impacts. Stakeholders recognise the

importance of sustainability and want to ensure and demonstrate that their fishing/aquaculture activities are sustainable. In addition to the environment, commercial wild-catch placed "Industry" as their highest priority. The Indigenous priorities were "community" and "people".

Despite the above emphasis on environment and sustainability, when each sector was asked which was their "single biggest issue", those relating to "access" were rated the highest by most survey respondents in the commercial wild-catch, and recreational sectors. Access was also a significantly important issue for Indigenous people behind "commercial opportunities" and for commercial aquaculture behind "food production" and "breeding".

It was very apparent from grass roots stakeholders across all sectors that the single biggest issue currently being grappled with in Northern Territory fisheries and aquaculture is the implications of the Blue Mud Bay (BMB) High Court decision, which recognised Traditional Owners' rights to the intertidal zone on Aboriginal Land, affecting somewhere between 80-85% of the NT coastline. The practical outcome of the BMB case is that entry into waters over Aboriginal Land for a purpose such as fishing (either recreational or commercial) requires permission from the relevant land trust[4], except in areas that have entered into an agreement with the Government for open access. Whilst this decision opens the possibility of unprecedented Aboriginal control and involvement in varied marine industries and environmental and cultural conservation, it has obvious implications for access and allocation for both commercial and recreational fishers operating around the NT coast. The interim arrangements, which have waived the need for an access permit since 2008, will not continue indefinitely, and more enduring arrangements are required.. This issue is the prime driver of the NT RAC's strategic RD&E directions for 2019-2024.

Although access to NT fishery and aquaculture resource is the same underlying driver, it has a range of implications for each sector.

Indigenous

There is a significant immediate challenge for the Indigenous sector to introduce and manage a permit system to enable commercial and recreational access to inland and coastal waters on Aboriginal Land after interim access arrangements expire. There is obvious potential for such a system to also collect catch and effort information to assist in monitoring and management of the coastal fishery resources. As yet, it is unclear to what extent this system will integrate with that of NT fisheries Department, if at all, but it would be mutually beneficial if it did (not least to prevent duplication of reporting for commercial fishing operations). In addition to a permit system, it is likely that a significant extension project will be required to educate both commercial and recreational fishers about requirements of fishing on Aboriginal Land.

In addition to developing the permit system required to access Aboriginal Land, the NLC is managing significant investment by the Commonwealth government to support the participation of Traditional Owners in commercial fisheries and marine resource management activities. The NT Government is also exploring complimentary support and grant programs to assist Traditional Owner involvement in the seafood industry. The challenge for the Indigenous sector is developing the capacity of Indigenous people in rural areas that want to be involved in various aspects of the seafood industry and supporting them with the training and supply-chain infrastructure necessary for a successful seafood business. This presents an opportunity for the seafood industry to be involved with training and business development in remote Aboriginal communities.

[4] See the commentary by Lauren Butterly 'A decade on: What happened to the historic Blue Mud Bay case (and why is it in the news again)?' on AUSPUBLAW (20 June 2017) https://auspublaw.org/2017/06/what-happened-to-the-historic-blue-mud-bay-case

Constructive, mutually beneficial partnerships between the Indigenous and commercial sectors is a key to the success of such ventures.

Similarly, there is opportunity for two-way training between Fisheries Division staff and Indigenous people in the management of remote coastal fishery resources. It is expected that this would build on and expand the scope and capacity of the current Indigenous Marine Ranger program.

Recreational

Much of the popular coastal fishing areas area around Darwin and the van Diemen Gulf are not currently impacted by the BMB decision either because 1) they are not associated with an Aboriginal Land Trust (ALT) or 2) access to tidal waters over Aboriginal Land is still be permitted because the Northern Territory Government has entered into an Agreement with the relevant Aboriginal Land Trust. Nevertheless, the recreational sector is concerned about the implications of the BMB decision and does not want to lose access to the high quality fishing enjoyed by thousands of locals and interstate and international tourists in other more remote areas associated with ALTs and therefore requiring permits from the end of the interim arrangements. As yet, it is too early to gauge the permit requirements that may be sought from recreational fishers and whether they may provide individual or blanket access; there will no doubt be lengthy and ongoing negotiations in this respect. Regardless, there remains the opportunity for individual recreational fishers, groups of fishers or fishing tour operators to negotiate with Indigenous communities associated with an ALT for permits and access to specific coastal fishing areas. Again, such arrangements could be mutually beneficial: potentially offering strictly controlled and high quality fishing opportunities to recreational fishers and, in turn, a revenue stream or business opportunity to the Indigenous community who manages the area.

Commercial

The commercial wild-catch sector has undergone more than two decades of continually reducing access to NT coastal regions and resources as a result of spatial closures implemented variously to segregate them away from important recreational fishing areas, Aboriginal Land or Marine Protected Areas. They are now looking for greater security and certainty for the future of their seafood businesses based on NT coastal fishery resources. Lack of business certainty is a major impediment to investment in the NT commercial seafood industry. Whilst the change in permit requirements associated with the BMB decision is a challenge to the commercial fishing industry in terms of raising uncertainty about their access, it also presents an opportunity for commercial wild-catch operators to partner directly with coastal Indigenous communities to secure long-term access to specific areas of the NT coastline. Not only will this benefit commercial operators, but the TOs and Indigenous communities can benefit from additional employment opportunities associated with working in the seafood industry.

Not dissimilar to the commercial wild catch sector, there will be mutually beneficial opportunities available to the aquaculture sector through negotiating access to prime coastal regions suitable for different types of aquaculture. In fact, such arrangements have been well established for decades in both Western Australia and the Northern Territory with respect to pearl aquaculture and grow-out, and there is evidence of similar arrangements beginning to be negotiated for newer aquaculture ventures such as prawns, sea cucumbers, giant clams and tropical rock oysters.

3 RD&E PLAN 2019 – 2024

3.1 Purpose

The NT Research Advisory Committee RD&E Plan provides a framework to identify the key strategic research needs of the fisheries sector under its jurisdiction for the 5 year period from 2019 – 2024.

The RD&E Plan aims to ensure that the research program meets both jurisdictional and, where appropriate, national strategic RD&E goals and addresses the major challenges facing the Northern Territory seafood industry, including the commercial, aquaculture, recreational and Indigenous sectors.

Where possible, this plan will link with other related strategies to enable efficiency and leverage opportunities e.g. other RACs, FRDC subprograms, FRDC coordination programs, FRDC sector based program.

3.2 Framework overview

3.3 Goals

The key RD&E investment goals for the NT RAC over the period of the Plan are outlined below.

Goal 1: Demostrated resource sustainability

- Cost effective monitoring and assessment methods to determine status of key target species
- Harvest strategies with appropriate limit reference points, target reference points and decision rules, particularly for data poor fisheries (and sectors)
- Mangement arrangements to ensure cumulative impacts of fisheries and other activities on habitats and ecosystems are sustainable
- Understand the environmental drivers potential impacts of climate change on resources

Goal 2: Fine-scale spatial information to support mangement

- Collect fine-scale catch (and effort) data from all extractive users of fishery resources (particularly focused on recreational and indigenous)
- Collate detailed spatial information on the "value" of coastal resources to the different sectors (e.g. culturally and spiritually important indigenous areas; high quality recreational fishing areas; and economically valuable areas for commercial fisheries and aquaculture)
- Combine the above information into a Geographic Information System (GIS) based framework to allow managers and stakeholders to evaluation sectoral access and allocation issues and trade-offs.

Goal 3: Equitable cross-sectoral access and allocation arrangements

- Develop mutual understanding of each sector's "values" placed on coastal resources
- Clearly articulate fishery objectives with respect to ecosystem, social and economic requirements
- Foster the potential for strategic alliances and partnershipts between indigenous communities and stakeholders from the recreational sector (including fishing tour operators), commercial wild-catch and commercial aquaculture sectors
- Explore opportunities to reduce conflict between the commercial wild-catch (especially barramundi) fishers and recreational fishers

Goal 4: Development of indigenous businesses

- Training and support for indigenous people and communities to be involved in commercial seafood businesses and recreational business ventures
- Identify and address barriers to successful indigenous involvement in seafood and fishing businesses

Goal 5: Improved compliance monitoring

- Increased compliance will be needed to deal with the implementation of permits and changed access arrangements to coastal fisheries associated with Aboriginal Land Trusts
- Build capacity and monitoring and compliance capability of the Indigenous Ranger programs

Goal 6: Profitability of aquaculture ventures

- Improve nutrition, feeding strategies, health and overall husbandry techniques to increase profitability of developing aquaculture ventures.

3.4 Strategic RD&E investment priority areas

RD&E Program1. Environment	
Priority Area 1 **Informing best practice fishery management**	• Harvest strategies with appropriate limit and target reference points and decision rules; • Management arrangements to ensure cumulative impacts of fisheries and other activities on habitats and ecosystems are sustainable; • Develop management strategies that respond to environmental condition and optimise resource use; • Appropriate and cost-effective harvest strategies developed for NT fisheries;
Priority Area 2 **Demonstrated resource sustainability**	• Appropriate-scale catch (and effort) data from all extractive users of fishery resources; • Better knowledge of ecological drivers in northern Australia fishery resources; • Cost effective monitoring and assessment methods to determine stock status;
Priority Area 3 **Animal health & biosecurity**	• Effective animal health and biosecurity strategies for natural fisheries resources and aquaculture products.

RD&E Program 2. Industry	
Priority Area 1 **Informing industry best practice**	• All sectors have appropriate best practice guidelines (for safety and animal welfare issues); • Increased recreational fisher understanding of post-release mortality, and uptake of techniques to reduce post-release mortality;
Priority Area 2 **Development of Indigenous businesses**	• Leadership, accountability, and extension support for Indigenous communities in place; • Culturally appropriate governance arrangements/frameworks/tools to support developing indigenous fisheries; • Increased capacity and participation of Indigenous people and communities involved in seafood and fishing businesses;
Priority 3 **Fostering productive relationships between sectors – access & allocation**	• Better strategies for reduced inter-sectoral conflict; • Recognised allocation of resources to fishing sectors; • Strategic partnerships between indigenous communities and the recreational sector (including fishing tour operators), commercial wild-catch and aquaculture sectors
Priority 4 **Development of market opportunities**	• Development of fishing tourism and seafood business opportunities supported by market research.
Priority 5 **Understanding social and economic drivers**	• Improved capacity to develop and monitor social, cultural and economic fishery objectives; • Understanding of illegal trade/markets and implement appropriate management strategies; • Established economic and social parameters to inform management decision-making and resource allocation across all sectors;

RD&E Program 3. Communities	

Priority 1
Synthesising and communicating information regarding NT fisheries
	• Improved transparency of access to information relating to NT fisheries
	• Visually aid decision making tools for:
	  ○ Increased spatial information and sectoral understanding on the values of coastal resources to the different sectors
	  ○ GIS-based framework containing information to allow managers and stakeholders to evaluate sectoral access and allocation issues and trade-offs.
	• Adopt innovative technological frameworks to display information to allow managers and stakeholders to evaluate sectoral access and allocation issues and trade-offs.

Priority 2 **Fostering productive relationships between sectors – improving industry structures**	• Trust in our industry both within industry and externally (community and government); • Improved structures and processes for peak bodies; • Regional governance structures to identify suitable representation of all sectors on NT fishery management groups.
Priority Area 3 **Fishing and aquaculture opportunities for indigenous communities**	• Improved governance systems for approved activity/transit in culturally significant places and sacred sites developed for integration into fisheries management • Development of training and support opportunities for Indigenous people and communities to be involved in commercial seafood businesses; • Benefits of fishing and including health, wellbeing, social and cultural benefits to Indigenous communities documented and supported through policy
Priority Area 4 **Fisheries monitoring Opportunities for improved management for indigenous communities**	• Increased capacity of Marine Ranger programs to participate in data collection (including monitoring and compliance), education and related fisheries RD&E • Methods to monitor, assess and communicate data relating to localised abundance trends of fisheries resources adjacent to Indigenous communities developed

RD&E Program 4. People	
Priority Area 1 **Increase leadership capacity of all fishing and aquaculture sectors**	• Increased capacity of all sectors to represent their constituents in natural resource management forums; • Future leaders identified and pathways for their development put in place;
Priority Area 2 **Involvement in mechanisms to develop capacity**	• A skilled workforce developed and maintained across all parts of the NT fisheries and aquaculture sectors, including training and support provided for Indigenous people to be involved in seafood and fishing businesses; • Consistent NT participation in national training and capacity building programs
Priority Area 3 **Support NT-based research capacity**	• Support post-graduate research candidate development in NT

RD&E Program 5. Adoption	
Priority Area 1 Identifying preferred and effective pathways for adoption.	• Sector specific understanding of how operators seek out, evaluate and adopt RD&E to improve operations; • Strategic determination of periodicity of adoption cycles to allow extension planning to meet temporal needs/patterns.
Priority Area 2 Effective processes to deliver research outcomes to end-users and broader community	• Advice in place regarding the use of various communications strategies (including social media) to distribute RD&E outcomes; • Mechanisms identified, developed and implemented to proactively engage stakeholders; • Stakeholder forums in place to engage end users in technological advancements and innovative solutions to shared problems.

4 RD&E PLAN Guidelines

4.1 INVESTMENT COLLABORATION

The RAC's are to be mindful of collaborative opportunities with external funding sources (other than the FRDC) as well as collaboration between the jurisdictional RACs, IPAs and FRDC subprograms. This collaboration occurs through the sharing of RD&E Plans as well as the results of priority planning processes. The annual planning workshop provides a forum for the sharing of these priorities to promote collaboration.

Collaboration provides the opportunity to share investment across common areas of interest and promote RD&E execution efficiency.

4.2 EXTENSION

Extension processes are embedded into all FRDC-funded RD&E. How results can be extended begin when a project is approved for funding, are considered in the design and proposal phase where priorities for end users are determined, continue during the project's execution through to the final published report. This is often easier for short-term applied research but needs to be more considered for longer-term, blue–sky research.

On 23 April 2010, the Primary Industries Ministerial Council (PIMC) approved a National Strategy for Fishing and Aquaculture Research, Development and Extension (RD&E) which establishes the future direction to improve the focus, efficiency and effectiveness of RD&E to support Australia's fishing and aquaculture industry.

The FRDC have adopted these as key principles with regards to encouraging and promoting Extension and Adoption. They are:

Principle 1: All stakeholders to value extension and adoption activities in the same way as research activities.
Principle 2: Extension will be a key focus in research project development
Principle 3: Project knowledge and outputs are actively managed
Principle 4: Effectiveness and impact of project extension activities are evaluated
Principle 5: Extension and adoption capacity is maximised and built upon.

It best practice for project managers to have given some thought to how the project outputs will be used and adopted by end users while developing the application. It is a FRDC requirement that an Extension and Adoption Plan is developed and submitted for each project.

4.3 EVALUATION OF PROJECTS

The FRDC has adopted the Commonwealth input, output, outcome reporting framework policy. The Department of Finance and Deregulation has determined that the FRDC's planned outcome is *Increased knowledge that fosters sustainable economic, environmental and social benefits for the Australian fishing industry; including indigenous, recreational, commercial and aquaculture sectors, and the community; through investing in research, development and adoption.* The FRDC's performance is measured against its ability to deliver this outcome.

The success of the RAC's planning, investment, management and adoption is measured by an evaluation framework that is based on adaptive management. The structure of the evaluation framework is as follows:

- A planning process that ensures investment is made against priorities where research can contribute to a significant improvement.
- An annual report evaluating the performance of individual projects against the targets in the RD&E Plan.

The FRDC has implemented the Rural RD&E Corporation Evaluation Framework methodology to achieve the total portfolio evaluation assessment. This is based on a rolling series of cost benefit analysis of project clusters (based on previous 5 years' investment). The results of the project cluster assessments links to the agreed KPIs that are relevant to that cluster. This process ensures that the investment decisions are continually being adjusted to ensure optimal investment performance. In this ongoing evaluation, the FRDC will measure the performance of RAC investments after the life of its RD&E Plan.

During the life of the RD&E Plan, the RAC should self-evaluate its performance against its identified Priority Areas as well as monitoring investment to ensure balance in investment across the FRDCs 5 programs. This is to be aligned with the prioritisation and RD&E Plan review processes undertaken in the October RAC meeting.

4.4 REVIEW OF THE RD&E PLAN

Annually, the RAC will review their RD&E Plan. This will occur at the October RAC meeting. The Plan will be reviewed to:

- assess performance against the identified Priority Areas of the Plan
- identify gaps against the Priority Areas of the plan
- determine priority areas for investment against these gaps

These annual plans will be circulated to all FRDC subprograms and partnership agreements unless it is deemed that there are areas of sensitivity, IP protection or commercial advantage that require protection.

At the beginning of December each year, the FRDC will hold an annual workshop for all RACs, Industry Partnership Agreements and National Initiatives to provide updates on priority areas for investment and any potential overlap and collaborative opportunities for the coming financial year.

The RAC, at each meeting, should also undertake a situational scan of the jurisdiction to identify any tactical or immediate areas of RD&E need that require short term or immediate remediation.

Appendix 7 – Example survey

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Background

The Fisheries Research and Development Corporation has funded this project to develop a research, development and extension (RD&E) plan for fisheries and aquaculture in the Northern Territory. Working with the Northern Territory Research Advisory Committee (NTRAC), we will develop a 5-year plan that will capture the views of as many people as possible.

The research, development and extension plan will be used to guide the Northern Territory Research Advisory Committee in making sure that research is carried out on high priority projects, and that Government investment is spread across commercial, recreational and Aboriginal fisheries and aquaculture.

It is critical that we get input from a wide range of people involved in fisheries and aquaculture so we can identify the biggest needs, and see how they might be addressed.

Because of the large distances and remote locations of these fisheries, and the diverse range of stakeholders, an online survey is the most efficient way of capturing the views of the largest number of people. This survey will collect information about you, your involvement in fisheries and aquaculture, your views on the biggest issues facing your sector and what can be done about those issues.

This survey will close on the 15th May 2018, and the final research, development and extension (RD&E) plan will be completed by 30th June 2018.

We thank you for taking the time to complete this survey.

You can see FRDC's Research Priorities HERE

1

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Background

This questionnaire is provided as an opportunity for you to have your say on future directions for research, development and extension for fisheries and aquaculture in the Northern Territory.

*** 1. Before you received the invitation to this survey, did you know about this project?**

- ◯ Yes
- ◯ No

2

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Background

*** 2. How did you hear about the project?**

- [ ] NT Fisheries
- [ ] Fisheries Research and Development Corporation (FRDC)
- [ ] Your own Association / Industry Council
- [ ] Word of mouth
- [ ] Other (please specify)

3

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

About you

We don't need to know who you are, but in this section, we would like to find out a little bit about you.

*** 3. What is your age?**

- ○ 18 to 24
- ○ 25 to 34
- ○ 35 to 44
- ○ 45 to 54
- ○ 55 to 64
- ○ 65 to 74
- ○ 75 or older

*** 4. What is your gender?**

- ○ Female
- ○ Male

*** 5. Are you of Aboriginal or Torres Strait Islander heritage?**

- ○ No
- ○ Yes, Aboriginal
- ○ Yes, Torres Strait Islander
- ○ Yes, both Aboriginal and Torres Strait Islander

*** 6. What is your postcode?**

4

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

About your involvement in the commercial fishing industry

We would like to know about your involvement in commercial fisheries you are involved in.

*** 7. What commercial fisheries are you mainly involved in?**
(You can tick more than 1)

- ☐ A1 - Coastal Line Fishery
- ☐ A2 - Coastal Net Fishery
- ☐ A3 - Bait Net Fishery
- ☐ A4 - Spanish Mackerel Fishery
- ☐ A5 - Offshore Net and Line Fishery
- ☐ A6 - Demersal Fishery - line and trap
- ☐ A7 - Barramundi Fishery
- ☐ A8 - Mud Crab Fishery
- ☐ A9 - Mollusc Fishery
- ☐ A10 - Pearl Oyster Fishery
- ☐ A12 - Aquarium Fishery
- ☐ A13 - Trepang Fishery
- ☐ A14 - Developmental Fishery Licence
- ☐ A15 - Restricted Bait Entitlement
- ☐ A17 - Squid Jigging Fishery
- ☐ A18 - Timor Reef Fishery
- ☐ B1 - Trader/Processor Sector
- ☐ D1 - Aboriginal Coastal Licence
- ☐ Northern Prawn Fishery

*** 8. What is your MAIN involvement in these fisheries?**

- ☐ Fisher
- ☐ Licence holder
- ☐ Quota holder
- ☐ Crew
- ☐ Vessel owner
- ☐ Operator
- ☐ Other (please specify)
- ☐ Wholesaler
- ☐ Processor
- ☐ Marketing
- ☐ Importer
- ☐ Retail
- ☐ Representative (or the like)

5

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Your involvement in industry associations

*** 9. Are you a member of an industry association?**

- ◯ Yes
- ◯ No

6

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

About your involvement in an industry association

*** 10. What industry associations are you a member of?**

- [ ] NT Seafood Council
- [ ] Australian Seafood Importers Association
- [ ] Australian Barramundi Farmers Association
- [ ] Seafood Industry Australia
- [ ] Pearl Producers Australia
- [ ] Northern Prawn Industry Association
- [ ] National Aquaculture Council
- [ ] Western Australia Fishing Industry Council
- [ ] Queensland Seafood Industry Australia
- [ ] Women's Industry Network Seafood Community
- [ ] Amateur Fishermen's Association of the Northern Territory
- [ ] NT Guided Fishermen's Association
- [ ] Other (please specify)

*** 11. How many years have you been a member of fishing industry associations (all combined) ?**

- ( ) less than 2 years
- ( ) 2-5 years
- ( ) 5-10 years
- ( ) more than 10 years

7

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Your involvement in a management advisory committee

*** 12. Are you involved in a fisheries management advisory committee**

- ◯ Yes
- ◯ No

8

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

About your involvement in a fisheries management advisory committee

*** 13. How many years have you been involved in fisheries management advisory committees (all combined)?**

- ◯ less than 2 years
- ◯ 2-5 years
- ◯ 5-10 years
- ◯ more than 10 years

*** 14. What fisheries management advisory committee are you involved in?**

- ☐ Northern Australian Fisheries Committee (NAFC)
- ☐ Barramundi Fishery MAC (BFMAC)
- ☐ Daly River Management Advisory Committee (DRMAC)
- ☐ Coastal Line Fishery Management Advisory Committee
- ☐ Offshore Snapper Advisory Group (OSAG)
- ☐ Mud Crab Fishery Management Advisory Committee
- ☐ Offshore Net and Line (Shark) Fishery Management Advisory Committee)
- ☐ Spanish Mackerel Fishery Management Advisory Committee (SMFMAC)
- ☐ Timor Reef Fishery Management Advisory Committee (TRFMAC)
- ☐ Other (please specify)

9

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Background - FRDC Research priorities

The FRDC has five investment program areas for research, development and extension. These are:

1. environment
2. industry
3. communities
4. people
5. adoption

The following questions will let you tell us what priorities are most important to you, and what the main issues are.

10

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Investment priorities areas

There are potentially many RD&E areas that are of interest to you.

*** 15. If you had $100 to spend on the FRDC's priority areas, how would you split it?**

***** You don't need to fill in each box *****
***** Answers must add up to $100 *****

Environment
(e.g. natural resource sustainability, biosecurity, habitat)

Industry
(e.g. business profitability, international competitiveness, opportunities for productivity increases, resource access, and experience or well-being benefits)

Communities
(e.g. understanding the interactions and co-dependence between fishing and aquaculture, and the wider community, knowledge about the social importance of fisheries)

People
(e.g. employing and developing young people, facilitating access to leadership development)

Adoption
(e.g. extension of results, develop a widely accessible knowledge bank)

11

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Drivers and opportunities

Which of the following factors do you think are most important to your commercial fishery/s.

*** 16. If you had $100 to spend on the following factors that may affect your fishery/business, how would you split it?**

***** You don't need to fill in each box *****
***** The answer must add up to $100 *****

Environmental factors (e.g. healthy ecosystems, sustainable fish stocks, endangered species)

Societal factors (e.g. access, resource sharing, developing young people, social licence, understanding social, health and wellbeing benefits of fishing)

Economic factors (e.g. economic impact, infrastructure and infrastructure planning, market access, market security, product quality, traceability)

External Issues (e.g. Seismic / oil & gas, Port use / facilities, Catchment / Coastal management, fracking and mining)

12

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Major Issues - which ones are important to you

There are a lot of issues that impact your commercial fishery. We would like to find out which ones are most important to you.

*** 17. If you had $100 to spend on RD&E on the following ENVIRONMENTAL ISSUES issues, how would you split it?**

***** You don't need to fill in each box *****
***** The answer must add up to $100 *****

Sustainability of target species

Sustainability of byproduct and bycatch species

Discarding

Threatened, Endangered and Protected Species

Impact on habitat (e.g. reefs)

Impact on ecological communities (food webs)

13

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Major Issues - which ones are important to you

*** 18. If you had $100 to spend on RD&E on the following SOCIETAL ISSUES issues, how would you split it?**

***** You don't need to fill in each box *****
***** The answer must add up to $100 *****

Bioregional Planning / MPA Displacement

Regulatory complexity

Access

Resource sharing and allocation rights

Native title and/or Aboriginal Land Rights Act

Environmental closures

Social licence (i.e. public support)

Data collection to inform management of recreational fishing

Data collection to inform management of commercial fishing

14

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries
Major issues - which ones are important to you

15

*** 19. If you had $100 to spend on RD&E on the following ECONOMIC ISSUES, how would you split it?**

***** You don't need to fill in each box *****
***** The answer must add up to $100 *****

Occupational Health & Safety

Succession planning / ageing industry

Labour

Training

Fish price

Competition

Fuel / power / water / packaging costs

Leasing / quota costs

Regulatory costs

Marketing

Use of byproduct / bycatch species

Regulatory complexity

Market security

Infrastructure and infrastructure planning

Replacement products

Product quality

Transport and logistics

16

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Major Issues - which ones are important to you

*** 20. If you had $100 to spend on RD&E on the following EXTERNAL ISSUES, how would you split it?**

***** You don't need to fill in each box *****
***** The answer must add up to $100 *****

Catchment and coastal management / development

Seismic survey activities

Pollution

Port facilities / other infastructure

Climate change

Fracking / mining

17

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

Project ideas

Now that we've got that out of the way, we would like to hear about any specific research project that you would like to see undertaken to address issues in your sector.

21. Describe what you think is the single biggest issue in your fishery or business.

22. What fishery, fisheries or species does this relate to?

23. Can you think of an RD&E project that would address that issue? If so, please enter in the box below.

24. What would you like to be achieved by that project?

25. If you would like to be contacted to provide more information regarding this or other project ideas, please supply your contact details below.

Name	
Phone number	
Email address	

18

NT Fisheries and Aquaculture RD&E Strategy - Commercial Fisheries

End of the survey

Many thanks in taking part in this survey. We will analyse the results and make them available to all participants and the wider industry.

26. If you have any other specific RD&E ideas, please list them in the box below.

27. Is there anything else you'd like to share about strategic RD&E in Northern Territory fisheries and aquaculture?

28. If you would like to be sent the results of this survey, please enter your email address below.

19