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FISHERIES RESEARCH &  
DEVELOPMENT CORPORATION

**FRDC Research Briefing  
Paper: Literature to inform  
the Senate Inquiry into the  
use of Quota system in  
managing fisheries and  
environmental outcomes**

Fisheries Research and Development Corporation

Version 1: Published 1 February 2021

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**FRDC Research Briefing Paper: Literature to inform the Senate Inquiry into the use of Quota system in managing fisheries and environmental outcomes**

2021

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The Fisheries Research and Development Corporation plans, invests in and manages fisheries research and development throughout Australia. It is a statutory authority within the portfolio of the federal Minister for Agriculture, Fisheries and Forestry, jointly funded by the Australian Government and the fishing industry.

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

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# Definitions

## **ITQ Individual transferable (catch) quota\***

A right to harvest a particular amount of resources, that can be transferred, e.g. by sale, lease, or will. A type of quota (a part of a Total Allowable Catch) allocated to individual fishers or vessel owners and which can be sold (*transfer of ownership*) to others.

## **ITE Individual transferable effort quota\*\***

Shares of a total allowable effort that are allocated to individuals. They can be traded permanently or temporarily. Analogous to individual transferable quotas in a fishery managed with a total allowable catch [TAC]. Usually issued at the start of a fishing season. One of the input controls that may be used to limit the impacts of a fishery. (*note: ITE is an extension from catch based controls - the effort rather than the catch is tradable*).

## **TAC Total allowable catch\***

It is the total catch allowed to be taken from a resource in a specified period (usually a year), as defined in the management plan. The TAC may be allocated to the stakeholders in the form of quotas as specific quantities or proportions.

## **TAE Total allowable effort\*\***

An upper limit on the amount of effort (such as number of vessels, days fished, number of hooks or fishing operations) that can be applied in the fishery. (*note: TAE is the effort based equivalent of TAC. Under a TAE, rather than controlling catch, total allowable effort is controlled*).

## **MEY Maximum Economic Yield\***

When relating total revenues from fishing to total fishing effort in a surplus production model, the value of the largest positive difference between total revenues and total costs of fishing (including the cost of labour and capital) with all inputs valued at their opportunity costs.

## **MSY Maximum Sustainable Yield\***

The highest theoretical equilibrium yield that can be continuously taken (on average) from a stock under existing (average) environmental conditions without affecting significantly the reproduction process. Also referred to sometimes as Potential yield.

Source: \*FOA Fisheries Terms Portal <http://www.fao.org/faoterm/collection/fisheries/en/>

\*\* Whichfish Glossary <http://whichfish.com.au/glossary/total-allowable-effort/>

# Introduction

## Senate Inquiry:

On 7 December 2020, the Senate moved that the following matter be referred to the Rural and Regional Affairs and Transport References Committee for inquiry and report by 24 June 2021.

The fisheries quota system and examining whether the current 'managed microeconomic system' established around a set of individual transferable quotas results in good fishing practice, with particular reference to:

- a) good fishing practice that is ecologically sustainable with an economic dynamic that produces good community outcomes;
- b) how the current quota system affects community fishers;
- c) whether the current system disempowers small fishers and benefits large interest groups;
- d) the enforceability of ecological value on the current system, and the current system's relationship to the health of the fisheries;
- e) whether the current system results in good fishing practice that is ecologically sustainable and economically dynamic, and produces good community outcomes; and
- f) any other related matters.

Submissions close on 12 March 2021.

## Link to the Senate Inquiry home page:

- [https://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate/Rural\\_and\\_Regional\\_Affairs\\_and\\_Transport/Fisheriesquota](https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Rural_and_Regional_Affairs_and_Transport/Fisheriesquota)

## Purpose of this report:

Our endeavour is to highlight key literature (evidence-based-science) investigating Individual Transferable Quota (ITQs) so that our stakeholders are informed, and can find and use the relevant research to prepare submissions.

Although the primary focus of this report is on FRDC funded research, a list of 'other literature' (Australian and International) addressing ITQs is provided.

The report is not prescriptive or exhaustive. The report is a high level document, pulled together as quickly as possible to assist in identifying key available information in relation to the Terms of Reference (TOR) of the Inquiry.

## Target Audience:

- Fishing stakeholders who are interested in ITQs (e.g., industry, recreational fishers, Indigenous, fisheries managers, policy managers; non-government organisations, broader community).
- Those preparing submissions.

## Point of clarification:

The FRDC has assumed the inquiry investigating ITQ issues is across both Commonwealth and State waters.

# Method

A list of literature (FRDC reports and other published papers) addressing ITQs was compiled as a high-level document by the FRDC in collaboration with experts in this field, and using online searches engines (Web of Science and Scopus).

The literature includes:

- FRDC funded projects addressing ITQs:
  - Citation
  - URL to each full report
  - A brief summary of the research relevant to the TORs listed above
- Other literature (Australian and International) addressing ITQs:
  - Citation
  - URLs to the dedicated journal

The base list of 'other literature' was compiled from *Pascoe, S., Hoshino, E., van Putten, I. and Vieira, S. (2019). Retrospective assessment of ITQs to inform research needs and to improve their future design and performance, FRDC Final Report 2017-159. CSIRO Oceans and Atmosphere, Hobart, March.* Additional publications were identified and incorporated by experts in this field and from online journal searches (**Appendix one**).

Citations were collated in an excel spreadsheet to allow users to search and sort the available literature as they so choose.

# Results

## FRDC funded projects addressing ITQs:

The FRDC research projects that address ITQs are listed below. A brief summary of the research relevant to the TORs for each project is provided.

**Table 1\*:** Senate Inquiry into the use of Quota system in managing fisheries and environmental outcomes - Terms of Reference a to f

#	Term of Reference
<b>a</b>	Good fishing practice that is ecologically sustainable with an economic dynamic that produces good community outcomes) [ <i>Economic and Ecological</i> ]
<b>b</b>	How the current quota system affects community fishers [ <i>Social</i> ]
<b>c</b>	Whether the current system disempowers small fishers and benefits large interest groups [ <i>Indirect impacts</i> ]
<b>d</b>	The enforceability of ecological value on the current system, and the current system's relationship to the health of the fisheries. [ <i>How the quota system is achieving an ecological sustainability outcome</i> ]
<b>e</b>	Whether the current system results in good fishing practice that is ecologically sustainable and economically dynamic, and produces good community outcomes [ <i>considerable overlap with TOR a</i> ]
<b>f</b>	Any other related matters

\*TOR in this table are mapped to the FRDC funded research below, e.g., Project 2017-159 related to TOR a and b.

## FRDC Project 2017-159 (addresses TOR a, b, e, d in Table 1)

[Pascoe, S., Hoshino, E., van Putten, I. and Vieira, S. \(2019\). Retrospective assessment of ITQs to inform research needs and to improve their future design and performance, FRDC Final Report 2017-159. CSIRO Oceans and Atmosphere, Hobart, March. CC BY 3.0.](#)

This study examined how ITQs and ITEs in Australia have performed relative to sustainability, economic and social criteria; and investigated factors what may be underlying these successes or failures. The study includes a review of international experiences with ITQ management as well as a description of the key ITQ and ITE fisheries in each jurisdiction. A survey of fishers, scientists and managers was undertaken to determine their perceptions around the performance of ITQs/ITEs, and to estimate what factors may contribute to these perceptions of performance. Furthermore, key ITQ and ITE fisheries in each jurisdiction of Australia were identified as part of this study (see **Appendix two**).

### **FRDC Project 2016-146 (addresses TOR a, d, e in Table 1)**

[Knuckey, I., Boag, S., Day, G., Hobday, A., Jennings, S., Little, R., Mobsby, D., Ogier, E., Nicol, S. and R. Stephenson \(2018\). Understanding factors influencing under-caught TACs, declining catch rates and failure to recover for many quota species in the SESSF. FRDC Project No 2016-146. Fishwell Consulting, 2018. \[CC BY 3.0\] 164pp.](#)

This report includes an issue paper on Quota Ownership and Trading, which was one of the issues investigated to look for explanatory factors to account for under-caught TACs, declining catch rates and recovery concerns for quota species in the Southern and Eastern Scalefish and Shark Fishery (SESSF).

### **FRDC Project 2015-202 (addresses TOR a, d, e in Table 1)**

[Pascoe, S., Hutton, T., Hoshino, E., Sporcic, M., Yamazaki, S. and Kompas, T., 2018, Maximising net economic returns from a multispecies fishery, FRDC Project No 2015-202, FRDC, Canberra. CC BY 3.0](#)

This study looked at what factors limit maximising economic returns in multi-species fisheries. One of those factors examined was having quota on too many additional (secondary) species, which was found to be counterproductive, as the Fishery is largely constrained by the quota for the primary species caught. Imposing quotas also on secondary species can result in a situation where a minor species becomes a “choke” species, restricting the total fishery for little benefit. Reducing the number of species subject to quota constraints to only those that were most important (in terms of revenue) resulted in improved economic performance of the fishery as well as lower levels of discarding. However, in the model changes in targeting ability of the fleet was not considered, so monitoring of fisher behaviour in response to proposed management regimes that only have a few species under quota would be essential.

### **FRDC Project 2010-317 (addresses TOR b, f in Table 1)**

[Leyland, G. \(2012\). Maximising benefits of ITQ management in the Western Rock Lobster Fishery. FRDC and Western Australian Fishing Industry Council, FRDC Final Report 2010-317 pp 68.](#)

This project informed the Western Rock Lobster industry members of the opportunities that moving to ITQs provided and to facilitate a smooth transition to ITQs.

### **FRDC Project 2010-229 (addresses TOR b, c, f in Table 1)**

[Sen, S. \(2011\). Empowering Industry RD&E: Easy-to-read Guide on Assisting fishing businesses adjust to implementation of quota control management in their fishery. Fisheries Research and Development Corporation and Fisheries Economics, Research and Management, FRDC Final Report 2010-229 pp 62.](#)



This project interviewed a range of fishers from fisheries that are moving to ITQs management, to understand their areas of concern and what information they would require to better adapt their businesses to operate efficiently and profitably under ITQ management. It produced a comprehensive but easy-to-read guide targeted particularly for use by fishers on "Understanding and adapting fishing businesses to ITQ management; and examine and document the unintended consequences of ITQ implementation.

[Sen, S. \(2012\). From Hunter to Harvester - Adapting your fishing business to quota management - A Guide. Fisheries Research and Development Corporation and Fisheries Economics, Research and Management pp 47. \[Product of FRDC Final Report 2010-229\]](#)

The purpose of this handbook is to help operators in a fishery going to or recently moved to quota, to navigate through the business decisions regarding ITQs, and to help adjust their business to the new system. (Note: This guide does not discuss the pros and cons of ITQs or the different quota allocation methods but has many publications on the subject listed at the end of the guide).

#### **FRDC Project 2004-030 (addresses TOR a, d, e in Table 1)**

[Little, L.R., Begg, G.A., Goldman, B., Williams, A. J., Mapstone, B.D., Punt, A.E., Russell, M., Kerrigan, B. Officer, R., Slade, S., Muldoon, G. and Penny, A. \(2009\). Modelling Individual Transferable Quotas as a Management Tool in the Queensland Coral Reef Finfish Fishery. Fishing and Fisheries Research Centre Technical Report No 3. Fishing and Fisheries Research Centre, James Cook University, Townsville. FRDC Final Report 2004-030. pp 174.](#)

In July 2004, an ITQ system was implemented in the Queensland Coral Reef Fin Fish Fishery (CRFFF). This project focused on extending the existing Management Strategy Evaluation (MSE) framework for the GBR CRFFF so that management controls evaluated could include catch limits implemented as ITQs. The project evaluated the likely effects on the sustainability of common Coral Trout and Red Throat Emperor of regional shifts in catch distributions in response to spatial closures and potential displacement of fishing effort associated with the GBRMPA Representative Areas Program; and evaluated alternative management strategies for common Coral Trout and Red Throat Emperor in the GBR CRFFF in terms of the trade-offs among the objectives of the commercial, recreational and charter fisheries.

#### **FRDC Project 1999-104 (addresses TOR a, b, c in Table 1)**

[Frusher, S., Eaton, L. and Bradshaw, M. \(2003\). Impact of management change to an individual transferable quota system in the Tasmanian Rock Lobster Fishery. FRDC Final Report 1999-104, pp 267.](#)

This project assessed the response (fleet dynamics) of Tasmanian Rock Lobster fishers to changes in management, including any change in the rules, which fishers used to

influence their fishing decisions prior to and after quota implementation. The project evaluated the impacts (catch and effort) of Rock Lobster fishers on other fisheries prior to and post quota implementation and determined socio-economic changes associated with implementation of quota management and establish performance indicators relevant to managing the fishery.

### **FRDC Project 1997-144 (addresses TOR a, b, d, f in Table 1)**

[Kaufmann, B., Geen, G. and Sen, S. \(1999\). Fish Futures: Individual transferable quotas in fisheries. FRDC and Fisheries Economics, Research and Management LTD. pp 251. \[Product of FRDC Project 1997-144. A practical guide to ITQs for fishery managers and the fishing industry\]](#)

This book provides reference material addressing how an ITQ system might work in practice. For those interested in the policy rationale for why ITQs were considered for Australian fisheries, this report provides some of that history. It describes ITQ implementation options and provides, where possible, examples of how effective these options have been in various fisheries jurisdictions; and documents the ways that these issues have been tackled by various fisheries management agencies.

### **FRDC Survey - Unpacking the Consumer Seafood Experience 2019 (addresses TOR a, b in Table 1)**

[Unpacking the consumer seafood experience a 2019 update \(June 2019\). FRDC and Innovative Solutions. pp 81.](#)

Building on the 2016 baseline survey, the 2019 survey used the existing framework to identify and respond to the perceived barriers to the purchase and consumption of fresh seafood among Australian consumers (n = 2002 adults; online survey). The coverage of the research included collecting information on consumers' buying, cooking and eating experiences with seafood, along with their perceptions of the sustainability of the fishing industry. Consumers rated a range of industry issues according to the influence of those issues on seafood purchasing, including factors such as whether a seafood or species is sustainable and managed by fishing quotas (see page 58).

### **New FRDC Projects commencing 2021**

Two projects have been recently approved by the FRDC:

2019-165: Design aspects of well-functioning ITQ markets (CSIRO). This project has two objectives: (i) Advice on how managers can make use of network analysis and other high-level metrics of market structure and performance to monitor quota market performance and contribute to evidence-based decision-making regarding market design and operation; and (ii) Better understanding, and functioning, of quota markets in case study fisheries leading to improved fishery performance.

2020-029 Responding to unintended consequences – evaluating changes to fisheries under ITQ systems (IMAS). This project aims to: (i) Assess the effects of adoption and ongoing management of ITQs including consequences that flow from ITQs and the effects of the adoption on specific performance indicators; (ii) Develop adaptive management options for existing ITQs that will assist in the identification of unintended and unwanted consequences and management of their impact; (iii) Better support managers in planning for the mitigation and management of unintended consequences over time, including the cost of implementing change; and (iv) Provide options to fishery managers and stakeholders to assist in the adjustment of existing fisheries management under ITQs to avoid, or mitigate, unintended and unwanted negative consequences and/or enhance unintended but positive consequences.

### **Other literature (Australian and International) addressing ITQs:**

Other literature (Australian and International) addressing ITQs is collated in **Appendix one**.

## **Communication and Extension**

This report was published on the FRDC website as a living document to provide visibility and accessibility to the evidence-based-science that addresses ITQs to our stakeholders.

New papers/reports will be added to this living online document as useful literature is identified, e.g., literature that was not identified for inclusion in this document and/or as new literature becomes available.

## **Appendices**

Citations were collated in an excel spreadsheet to allow users to search and sort the available literature as they so choose. Tab one of this excel spreadsheet is Appendix one and Tab two is Appendix two.

**APPENDIX ONE:** Literature addressing Individual Transferable Quota (ITQs): 'FRDC funded projects' and 'Other Literature (Australian and International)'

**APPENDIX TWO:** Key ITQ and ITE fisheries in each jurisdiction - Australia