

To develop the MDCA network and promote FRDC principles

T. Hoile



Australian Government
**Fisheries Research and
Development Corporation**

Project No. 2009/308



FRDC PROJECT NUMBER: 2009/308

**PROJECT TITLE: To develop the Marine Discovery Centres
Australia (MDCA) network and promote FRDC principles**

MILESTONE NUMBER: FINAL REPORT

PRINCIPAL INVESTIGATOR: Tim Hoile

July 2011

Copyright Fisheries Research and Development Corporation and Star of the Sea Marine Discovery Centre, 2011.

This work is copyright. Except as permitted under the Copyright Act 1968 (Cth), no part of this publication may be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owners. Information may not be stored electronically in any form whatsoever without such permission.

Disclaimer

The authors do not warrant that the information in this document is free from errors or omissions. The authors do not accept any form of liability, be it contractual, tortious, or otherwise, for the contents of this document or for any consequences arising from its use or any reliance placed upon it. The information, opinions and advice contained in this document may not relate, or be relevant, to a readers particular circumstances. Opinions expressed by the authors are the individual opinions expressed by those persons and are not necessarily those of the publisher, research provider or the FRDC.

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

ISBN 978-0-646-56246-9

Contents

Page

1. Title Page
2. FRDC Project Details
3. Contents
4. Non Technical Summary
5. Non Technical Summary: Outcomes achieved to date
6. Acknowledgements
6. Background
7. Need
8. Objectives
9. Methods
12. Results/Discussion
17. Benefits and adoption
18. Further Development
20. Planned outcomes
21. Conclusion
22. References
23. Appendix 1: Intellectual Property
23. Appendix 2: Staff involved with the project
25. Appendix 3: “Fish Forever” model – media article
27. Appendix 4: Photographs of science equipment
29. Appendix 5: An Article from HB MDC “Discovery News” highlighting TI MDC’s visit
30. Appendix 6: Model Surveys (raw data)
35. Appendix 7: High-level Science Materials Wish List
37. Appendix 8: Where does our Seafood come from? DVD
38. Appendix 9: Article highlighting FRDC visit
39. Appendix 10: Media Article in FISH, June 2011
40. Appendix 11: “Fish Forever” Model Assembly Diagrams
41. Appendix 12: “Fish Forever” Screen Layouts follow

2009/308 To develop the Marine Discovery Centres Australia (MDCA) network and promote FRDC principles

PRINCIPAL INVESTIGATOR: Mr Tim Hoile

ADDRESS: Marine Discovery Centre

333 Military Rd

Henley Beach

SA 5022

Telephone: 08 8356 8943 Fax: 08 8235 1835

OBJECTIVES:

- 1 More Australians will understand the benefits of by-catch reduction devices.
- 2 More Australians will understand the best methods to release fish.
- 3 More Australians will understand the benefits and the importance of the fishing industry.
- 4 The health benefits of seafood will be promoted.
- 5 More Australians will understand the significance of fishing experiences that people enjoy.
- 6 More Australians will understand the economic, environmental and social benefits arising from the fishing industry.
- 7 More Australians will understand the ways in which the fishing industry supports communities in rural and regional Australia.

NON TECHNICAL SUMMARY:

OUTCOMES ACHIEVED TO DATE

This project has resulted in the development of four “Fish Forever” interactive models; provision of high-level science equipment for five Marine Discovery Centres Australia (MDCA) members, a national website and a virtual fish dissection DVD. These resources are being used within an active network of marine discovery centres across Australia. The project has also provided ten marine discovery centres opportunities to undertake special projects based on the needs of each member centre, as well as promoting ongoing benefits through sharing of educational outcomes, resources, information, and marketing ideas. The MDCA has a variety of highly skilled personnel whose expertise has been shared through these special projects.

While the project has not quantified the level to which the objectives have been achieved, the project outputs have been designed to deliver a consistent message across the MDCA network. The MDCA visitor base includes teachers, the general community and around 90,000 school children each year. These visitors are being educated about sustainable fishing principles in an entertaining and engaging way.

The marine discovery centres (MDCs) involved in this project include Ballina Marine Discovery Centre (Ballina MDC) in New South Wales, Henley Beach Marine Discovery Centre (HB MDC) in South Australia, Queenscliff Marine Discovery Centre (QMDC) in Victoria, Bondi Beach Marine Discovery Centre (Bondi MDC) in New South Wales, Woodbridge Marine Discovery Centre (WMDC) in Tasmania, the Dolphin Discovery Centre in Bunbury (Bunbury DDC) Western Australia, Sapphire Coast Marine Discovery Centre (SCMDC) in New South Wales, Naturaliste Marine Discovery Centre (NMDC) in Western Australia, Hastings Point Marine Environments Field Study and Resource Centre (Hastings Pt MDC) New South Wales and Thursday Island Marine Discovery Centre (TI MDC) in Qld.

The project aimed to produce two core outputs for this project - development of the MDCA website and 10 (at a minimum) models. In addition the project aimed to deliver a base for consistent messaging to teaching marine education. This has been achieved through the realised outputs, as per below.

The planned outputs were re-negotiated with the FRDC during the course of the project as a result of some MDCs identifying greater needs for high-level science equipment. This was agreed as it enabled these MDCs to promote FRDC Research.

The realised outputs were:

- Website www.mdca.org.au
- “Fish Forever” interactive model
- Science education equipment
- Virtual fish dissection DVD
- A series of special projects undertaken by Centres to address identified development needs.

Consistent messaging

As a result of this project, models and other teaching resources have been developed that present a balanced message regarding Australia’s fishing industry that is based on good science and includes FRDC Research. The project has also raised awareness of resources that are available across Australia and in particular FRDC based publications, and delivered a range of unplanned outcomes including extension and networking activities and development of strong relationships with the SeaNet network and other industry bodies.

KEY WORDS: education, schools, marine discovery centre, teaching, community, public support

Acknowledgements

Thank you to everyone who has supported this project especially the HB MDC Staff, behind the scenes, who have provided direction, advice and financial accounting including Michael Honey, Principal Star of the Sea School, Ursula Quack, HB MDC Office Manager and Jane Leonard, Star of the Sea School Bursar. John Agnew, HB MDC volunteer, has been a fantastic guide and supporter.

Throughout the project John Agnew has been a fantastic guide and supporter. Our HB MDC Honorary Senior Consultant has also provided excellent spelling and grammar checks. Particular thanks to Mick O'Connor and Lynda Hourigan, Ballina MDC, who've been great supporters of this project, completing all tasks professionally and promptly. Thanks to Andrew Denzin, Thursday Island Qld, who's making exceptional progress with TI marine education and we look forward to supporting his work. Kerrie Trees, Hastings Pt MDC, has also provided outstanding support, being most appreciative of her opportunities. Will Jones' passion for the marine environment and opinions and comments have also been valuable for the project, often providing a different perspective deserving of consideration. We've appreciated Phil Coulthard's insightful comments which have provided accurate observations. Pam Elliott and Ros Asten have provided consistent feedback for the project in all areas, including the interactive model which they weren't actually receiving. Thank you to Phil Armato, Queenscliff MDC, who ensured support for FRDC's Seafood Conference in Melbourne. Phil also gave excellent input, particularly for the "Fish Forever" model. We thank Sandy Clark and staff at NMDC for developing the fish dissection DVD which has been well received. Michael Burke provided excellent feedback for this report. Jen Robb and staff at SCMDC also utilised these opportunities to benefit their centre.

Our network of passionate marine educators was able to deliver more than the expected outcomes.

Thanks also to the support and advice received from FRDC staff, Peter Horvat, Julie Haldane and Jo-Anne Ruscoe in particular.

Background

Australia has a strong reputation in marine education. As part of the marine education delivery infrastructure in Australia, a number of MDCs have been established. The genesis for each centre differs, with some being located as part of government or private schools, others being community based, developed by state government Fisheries Departments or privately funded ventures.

In 2005, a group of these MDCs held a meeting in Ballina, NSW, to discuss key issues and form a collaborative group from around the country. This was an integral stage for the network in forming its goals, terms of reference and the development of a criteria-based proforma for other MDCs wishing to join. Following the network workshop held in Western Australia in 2007, the group officially became known as Marine Discovery Centres Australia (MDCA).

The original members included:

- Ballina Marine Discovery Centre in NSW
- Henley Beach Marine Discovery Centre in SA
- Queenscliff Marine Discovery Centre in VIC
- Bondi Beach Marine Discovery in NSW
- Woodbridge Marine Discovery Centre in TAS
- The Dolphin Discovery Centre in Bunbury WA

Members who have subsequently joined and are part of this project include:

- Sapphire Coast Marine Discovery Centre in NSW
- Naturaliste Marine Discovery Centre in WA
- Hastings Point Marine Environments Field Study and Resource Centre
- Thursday Island in Qld

The MDCA membership is a mixture of school-based, community-based, small private organisations, fisheries management-based and tourism-based centres, allowing a unique opportunity to utilise various strengths and provide input into solutions for perceived weaknesses. The target audience includes primary, secondary and tertiary students, educators, local and international community groups and sponsors.

Need

MDCA believes that education and promoting community awareness about sustainable fisheries management is a very important need. MDCA members provide educational opportunities and information to school students and community through a range of strategies. MDCA members also promote sustainable fishing practices that have been developed through good science. MDCA has a key role in informing and educating the general public and the education sector.

Vicki Spruill, SeaWeb's executive director, recently highlighted at Melbourne's National Coast-to-Coast Conference that whilst there is an abundance of scientific knowledge, there is a dearth of quality teaching and education about fisheries issues.

Recently, the FRDC commissioned the survey "Community perceptions of the fishing industry in Australia" (<http://www.frdc.com.au/AnnouncementRetrieve.aspx?ID=49942>) There were many interesting findings from the survey relevant to fisheries and marine education and communication, including the following comment:

"Clearly then there is a substantial challenge to better inform, educate and influence community perceptions about the long term sustainability of the fishing industry."

The results also reported community perceptions across the different sectors of the industry:

- There is a stronger level of confidence across the community about the sustainability of aquaculture (78%) and recreational fishing (67%).
- Perceptions are decidedly weaker in regards to commercial fishing (just 27% believing it's sustainable).
- Of note is that these community perceptions have appeared to have remained static for some time (compared with 2003 FRDC study). These results suggest that efforts during this period have been largely unsuccessful at driving changes in community perceptions. A separate and more targeted effort may be required if substantive change is to be achieved.

The *Research, Development and Extension Plan 2010–2015* is the FRDC's core strategic document relating to its investment in the fishing and aquaculture industry. A very important aspect includes: "Extension and adoption is crucial to delivering outcomes from investment in R&D. Current capabilities have been recognised by the National Fishing and Aquaculture RD&E Strategy as a significant gap. The Australian Government and the industry have expressed the need to do more in this area."

Marine Discovery Centres are in an excellent position to improve public perception of the Australian fishing industry.

The MDCA members understand the need for sustainable fisheries education and to be able to promote FRDC principles to the community.

Interactive models have been an enormous success at the HB MDC. Experience there has shown that these interactive models are the most valuable tool when promoting concepts to visitors. The use of interactive models engages the learners and reinforces key messages, including sustainable fishing strategies.

In addition there, is a basic need for MDCA to promote both the network and the educational opportunities it offers. A website provides a mechanism to do this, as well as enabling better communication between centres and stakeholders. It would also create a central point for MDCA target audiences looking for information about MDCs, as well as individual centres.

As an alternative to the interactive model and the scientific equipment, the NMDC chose to use the funding provided through this project to develop a virtual fish dissection DVD. This presentation included 3D animation, rendering, compositing and DVD authoring. The virtual fish dissection has been provided to all MDCA members, to be used as an education resource to compliment a range of fisheries science activities.

Objectives

- 1 More Australians will understand the benefits of by-catch reduction devices.
- 2 More Australians will understand the best methods to release fish.
- 3 More Australians will understand the benefits and the importance of the fishing industry.
- 4 The health benefits of seafood will be promoted.
- 5 More Australians will understand the significance of fishing experiences that people enjoy.
- 6 More Australians will understand the economic, environmental and social benefits arising from the

fishing industry.

7 More Australians will understand the ways in which the fishing industry supports communities in rural and regional Australia.

Methods

The Project Manager conducted surveys of MDCA members on resource requirements including website needs, science materials and evaluations. This enabled the Project Manager to gain a consensus and make informed decisions based on members' opinions. Proformas were developed for consultancies and science equipment, clearly defining the requirements of each MDC.

The annual MDCA workshops, funded by FRDC for the past 5 years, enabled further face-to-face discussions and clarification of member resource requirements. The Queenscliff Workshop, 2009, included preliminary discussions about the project, particularly the models and website.

Representatives from the member centres of MDCA have met in:

- Ballina, NSW, March 2005
- Adelaide, SA, May 2006
- Perth/Bunbury, WA, June 2007
- Woodbridge, Tas, May 2008
- Queenscliff, NSW, June 2009
- Sapphire Coast, NSW, April 2010
- Hastings Pt, NSW, June 2011

These workshops have been an outstanding success and have been well supported by FRDC staff.

The Sapphire Coast Workshop, 2010, provided updates and discussion about models, science equipment and reporting on special projects. Grant timelines and the importance of maximizing the grant to benefit each MDC were also highlighted. Members were encouraged to go above and beyond the Grant to deliver maximum benefit to FRDC. Professionalism and adhering to timelines were other important aspects.

Members were regularly updated with the milestone schedule of payments, these were forwarded from FRDC. Opportunities were provided for input into all Milestone Reports. Milestone Reports were provided to all members.

A key aim of the network is to develop consistent messaging through each MDC involved. In designing and building the interactive models, a key component was developing and fine tuning consistent messages about industry sustainability and practices that could be applied across all

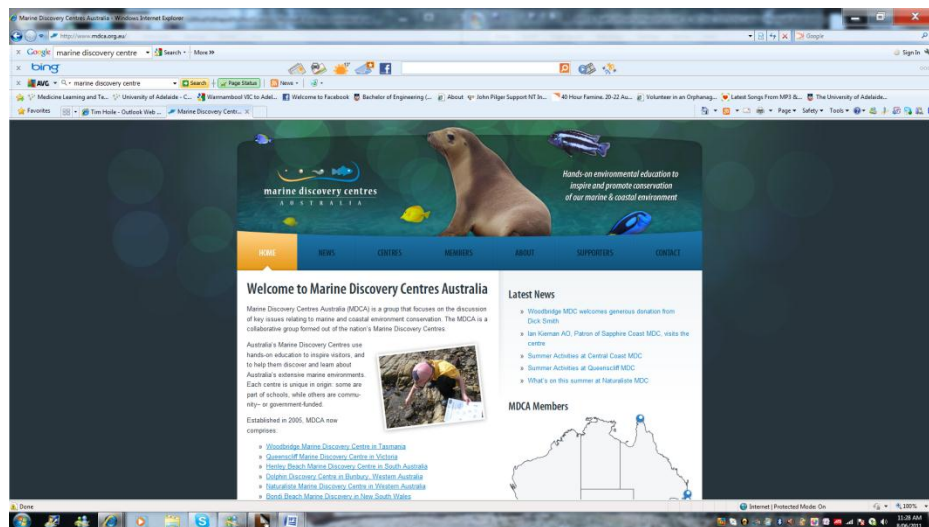
marine discovery centres. Appendix 11 shows the screen shots taken from the model that demonstrates these messages. You can also see the model storyboard at APPENDIX 12.

Website

The first phase of the project started with the development of the MDCA website. MDCA developed a website brief that was accepted by all members. Members were invited to circulate an electronic expression of interest application to possible web developers. Two applications were received and the web development company Clever Starfish (CS) was selected.

The website development phase commenced on October 20th, 2009. Communication between MDCA members and CS was organised through a Google email group setup by CS. The domain name www.mdca.org.au was secured. Each MDC provided information, photographs and video footage to enhance the site and their own particular link.

This project was completed within the timeline.



MDCA website home page

Model Development

The second phase of the project was to develop an interactive model. The strategy chosen to achieve this was to develop an interactive model that explores a theme/issue/concept that is common to marine environments, regardless of where you live eg impact of poor water catchment management or what the commercial fishing industry is about.

MDCA members developed an interactive model brief. Members were invited to circulate an electronic expression of interest application to possible candidates. Two applications were received and Arketype was selected to produce the model.

The first stage of the model was the design phase, which involved input from MDCA members. A functional touch screen with multi-level applications was designed.

The second stage involved developing the content and all members were invited to contribute with many giving considerable time, including some members who hadn't chosen the interactive. This contribution highlighted the commitment of the MDCA. Input on the model content was also provided by FRDC. The model content was approved by FRDC.

The third stage involved delivery of the models to Ballina, Queensliff, Bunbury and Henley Beach MDCs with appropriate installation information.

(See Appendix 3: "Fish Forever" model – article from "Discovery News" HB MDC)

Specialised Science Equipment

Whilst four centres chose to utilise the "Fish Forever" interactive option provided by this project, some centres chose to purchase sophisticated science equipment. This equipment included expensive, high-quality microscopes for use in the Centres and in the field, as well as sensors and data-loggers to measure environmental parameters. This option enabled centres to purchase equipment they otherwise may not have been able to afford, as well as promoting methods of scientific research that may be funded by FRDC.

The third phase of the project was to provide MDCA members with a range of specialised science equipment. This involved surveying participating MDCs to develop a list of equipment requirements. A consensus was reached and six quotes were sourced from a number of suppliers. Purchasing the equipment as a group gained a significant discount. CiderHouse PL provided the best quote and was selected as the preferred supplier. TI MDC, Hastings Pt MDC, Bondi MDC, SCMDC and WMDC's received science equipment, which they would otherwise have not been able to afford.

Appropriate signage for the science equipment was developed with input from member centres, promoting FRDC's support. This was printed and distributed to the relevant centres.

The science equipment, including the video-microscopes, is being utilised to help promote scientific research methods.

(See Appendix 4: Photographs of Science Equipment)



Signage for MDCA science equipment

Special Projects

As another component of this project, opportunities for centre-based projects were identified as an effective strategy to share knowledge and expertise around the MDCA membership, for the benefit of each MDC. MDCA members have diverse roles within their own centres, including executive directors, educators, managers, co-ordinators, executive officers, aquarists, technical officers and volunteers. The involvement of people with different roles within each organisation has enabled different perspectives on a variety of MDC aspects to be shared.

(See Appendix 5: Article highlighting Thursday Island MDC's visit- an example of a special project)

Virtual Fish Dissection DVD

Fish dissections are one of the most popular activities in the NMDC, so a virtual model provided the advantage of extension in a non-laboratory environment.

The NMDCs networks within the WA information technology industry identified Last Pixel as a potential candidate. Upon approaching them, they offered to conduct the project as one of their development projects, at a far reduced price.

Department of Fisheries, WA Finfish researchers provided anatomy detail and scientific input. NMDC staff contributed many in kind hours of project management, technical input and dissection demonstrations. This enabled the successful computer generated fish image to be as close to life-like as possible and to make the product audience and educator friendly. NMDC volunteers supplied several fish and a common local species was chosen (Australian herring) for ease of recognition.

A Progress report was provided to selected MDCA members and FRDC with an extract from the first draft of the fish dissection video. NMDC also sought approval from FRDC, including for FRDC logo inclusion.

Upon completion of the DVD, a copy was distributed to all MDCA members and FRDC.

Results/Discussion

This project has produced four "Fish Forever" interactive models, high-level science equipment for five Centres, a national website and a fish dissection DVD and has built capacity within the MDC network. It is important to note that each member of the MDCA is quite different. Each centre is at a different point along the developmental pathway, depending on how long they have been operating and their funding base. Consequently, the needs of each centre should be carefully established as part of the background research to clearly identify the most appropriate strategy or resource to be implemented. These strategies have also assisted the MDCA to develop more consistent messaging through each MDC.

These are discussed below:

Output 1 – website development

The first phase of the project was the development of a MDC network website: www.mdca.org.au. This portal was established so that member MDCs could have a national presence. The colourful, engaging website has introductory information, news, contact details, virtual tours and a map of Australia showing the location of each MDC. The general public is supporting this well presented website with regular email requests for information about the network and member centres.

Output 2 – “Fish Forever” interactive model

The “Fish Forever” interactive model has been a popular education tool for a wide variety of learners who visit the MDCs where this model is installed. It promotes positive messages about the Australian fishing industry, valuing our Australian seafood and the fisheries management tools that we have in place. After seeing the model in action at Melbourne’s International Seafood and Health Conference & Exhibition, Tasmanian SeaNet Extension Officer, Fiona Ewing, requested a copy of the “Fish Forever” interactive for school and community education use. Copies of the plans and the program were provided for her use. This highlights the ability of MDCA projects to be valued and acknowledged outside of the network.

This project produced a touchscreen interactive with both recreational fishing and commercial fishing promoting sustainable fishing practices. It is a multiple work station with multi-level capability with increasing difficulty, including demonstration of best methods to release fish, up-to-date informative information that is readable for various age-levels ie. age appropriate material with colourful, engaging graphics that grab the learners’ attention.

They are in place at Ballina MDC, QMDC, Bunbury DDC and HBMDC. These cost-effective interactive models have been an outstanding success with four for the MDCA and one developed by Oceanwatch Australia in Tasmania. Utilising the expertise of all MDCA members to provide good information, suggestions and ideas to engage the learner, proved to be a valuable and cost-effective exercise. (See Appendix 6 – Model Survey).

The interactive model promotes understanding on the best release fish techniques, the importance of fishing experiences and the social benefits of fishing. This will assist with informing the community about the role the fishing industry plays in supporting communities and the industry’s involvement in reducing environmental impact.

More Australians will understand the benefits of by-catch reduction devices, the benefits and the importance of the Australian fishing industry.

Output 3 – Science equipment

As an alternative to the “Fish Forever” interactive, five MDCs chose to purchase high-level science equipment for this project. This equipment enables MDCs to educate visitors in a wide range of techniques used in fisheries and marine research, many of which are used in research by FRDC. This equipment includes high quality microscopes for use in MDCs and in the field, as well as sensors and dataloggers to measure environmental parameters. The science equipment option enabled centres to purchase equipment they otherwise might not be able to afford. For example, the microEye video-microscope has been a very popular acquisition for a number of

centres, so much so that the Bunbury DDC purchased separately the video-microscope through the same supplier at the same price as was provided through this project.

This project allowed five MDCs to purchase sophisticated science equipment including a MicroEYE Discovery videomicroscope, a ViTiny digital microscope, SS Data Logger and a Video-light microscope for whole class viewing of plankton samples.

They are in place at TI MDC, Hastings Pt MDC, Bondi MDC, SCMDC and WMDC. By gaining a consensus with the choice of science equipment, the Project Manager was able to secure a considerable reduction in price through purchasing multiple units.

(see Appendix 7 High-level Science Materials Wish List)

Output 4 – Special projects

Special project opportunities proved to be an outstanding method of directing support for each centre to undertake a priority individual activity. Most of the member centres are quite isolated geographically from each other. Having face-to-face meetings enabled formal and informal discussions to share knowledge about a range of topics, including curriculum materials, strategic planning, building works, volunteer programs, marine biology, coastal education, visitor rates, sponsorship/grants, and aquaria plans. The resulting special project reports, prepared as part of this project, were also extremely valuable as they gave other members an insight into aspects which may have been relevant to their own needs. For example, Bruce MacKay's (NMDC) Aquaria Report for WMDC gave an excellent insight into aquaria design and construction. Other members were able to provide affirmation of individual MDC's work as well as constructive criticism. Marketing has been an area identified as a need for many MDCs. Phil Coulthard, Bunbury DDC, gave a presentation at the Global Eco Asia-Pacific Tourism Conference in Noosa, as part of his project activities. His experience was shared through his project report and will be extended at future workshops.

Through the project, various staff from MDCA member centres participated in special project opportunities. Utilising the expertise and strengths of all MDCs was seen as an opportunity for the network to grow. Initially intended to be a small part of the project, the special project opportunities have proven to be a significant aspect.

Eighteen people were directly involved in the special project activities. Each MDC was able to gain support for an identified need, which included the following:

1. SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)
2. Marketing
3. Aquaria management
4. Growth and development opportunities

Building on the positives of each centre and identifying weaknesses whilst providing constructive advice is essential for real growth. Project opportunities enabled support for each MDC from other members.

MDCA member

Henley Beach MDC

Ballina MDC

Bunbury Dolphin Discovery Centre

Thursday Is MDC

Hastings Pt Marine Environments Field
Study and Resource Centre

Naturaliste MDC

Woodbridge MDC

Sapphire Coast MDC

Bondi MDC

Queenscliff MDC

Special projects undertaken:To Bondi MDC, Ballina MDC and
Hastings Pt MDC to provide Strategic
Planning AdviceTo Henley Beach MDC to seek ideas for
their new MDC building plansAttended the Global Eco Asia-Pacific
Tourism Conference in Noosa

To Henley Beach MDC

To Henley Beach MDC and Ballina MDC

To Woodbridge MDC and Queenscliff
MDC

From Naturaliste MDC

To Queenscliff MDC

To Naturaliste MDC and Dolphin
Discovery Centre

To Woodbridge MDC

For example, Andrew Denzin visited HB MDC and this supported Andrew's work with building planning, good governance structures, potential funding/sponsorship streams, Volunteer programs and gaining an insight into HB MDC's history and growth. This will be an ongoing project where HB MDC will continue to support TIMDC's evolution.

As a result of feedback from MDCs, emails were reduced, as many found the amount of detail and number of emails was excessive. Emails were more succinct and more were sent to specific MDCs eg encouraging MDCs to utilize their project opportunities or explaining how to utilize science equipment allocation was needed for some but not all MDCs.

MDCs have eagerly embraced this opportunity to improve their centres Each MDC recognizes the importance of delivering outcomes professionally and within timelines.

The relationship with FRDC has enabled the MDCA network to flourish. This has been an outstanding opportunity for the network to grow with better science equipment, interactive models, and individual projects of high priority. The website is also an excellent platform for the MDCA to promote marine education and FRDC across the world. The network has enhanced its reputation as a collaborative, professional, well organised group that delivers quality educational outcomes.

The project has been promoted in many ways including Newsletter items for FRDC and Centres, Annual reports and Media Promotion wherever possible.

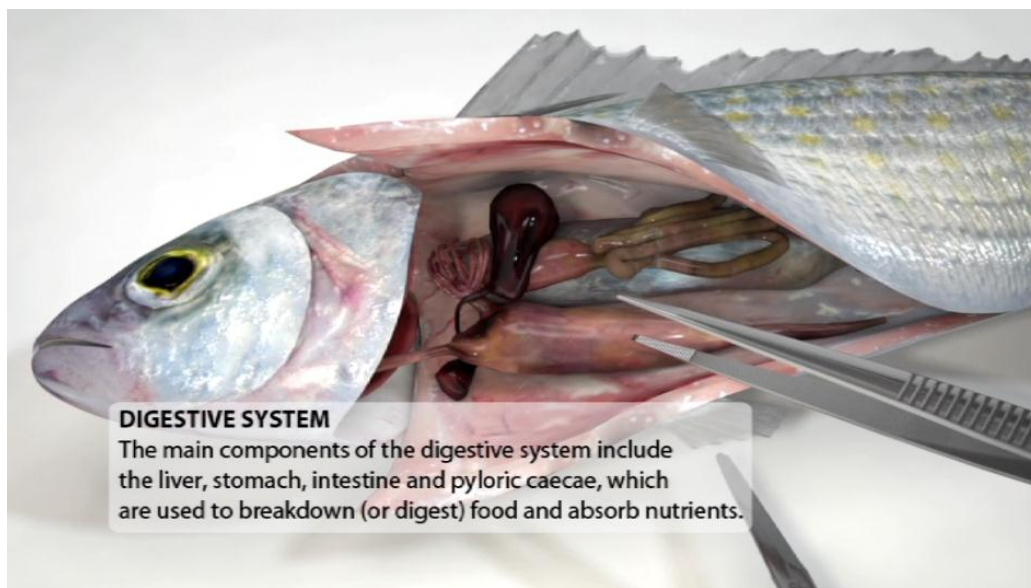
(See samples of media articles - Appendices 2,3,5,8,9 and 10)

The special projects included strategic planning, resource development, building planning, aquaria, constructive advice and technical advice for aquaria. The depth and expertise within the MDCA has enabled exceptional growth, this can be seen through the Reports.

Output 5 – Virtual fish dissection

As an alternative to the “Fish Forever” interactive and the purchase of science equipment, the NMDC developed a virtual fish dissection DVD presentation that includes 3D animation, rendering, compositing and DVD authoring. The dissection highlights the fish’s exterior, digestive system, heart, gills, reproductive organs and otoliths (ear bones). Being a virtual dissection, this resource can be used with a wide range of audiences and is particularly suitable as support material for fish dissection education activities conducted at MDCs. FRDC is acknowledged as a sponsor of this project in the DVD. The virtual fish dissection DVD has been distributed to all members of MDCA.

An addition to the original scope of this project was the development of a virtual fish dissection DVD by staff at the NMDC. This interactive uses a virtual rendition of an Australian herring, and includes vision of the exterior anatomy, reproductive organs, digestive organs, respiratory system, swim bladder and otoliths (ear stones). This is very cleverly designed and allows the learner to discover external and internal features without dissecting a real fish.



This interactive provides educators with a resource that can be utilised for pre- and post-dissection learning, as well as providing the ability to show early and middle childhood students realistic anatomy of a fish without the issues of blood and smell.

Additional outcomes

Many additional outcomes have been achieved, including support for the Melbourne Seafood Exhibition with the “Fish Forever” model on display and the Queenscliff MDC Volunteers manning the display. This was organised by Phil Armato, Manager QMDC. Feedback was provided by members on the “Sea Snakes and ladders” game developed by Peter Horvat, FRDC Communications Manager. Educational resources are being shared across the network, for example the NMDC’s Perth Beachcombers Education Kit which was delivered to every MDC.

As a result of Tasmanian SeaNet officer, Fiona Ewing attending the 2010 workshop in Eden several MDCs are developing relationships with their respective State’s SeaNet Officers. WMDC has representation on the Seafood Industries Partnership in Schools (SIPS) Steering Committee. This is a pilot project funded by FRDC matching commercial fishermen and aquaculture farmers with school students. Another exciting aspect is that many MDCs are strengthening relationships with their respective State’s SeaNet Officers. SA Seaset Officer, Nathan Bicknell, developed a DVD presentation for the HB MDC showing how various commercial fishers operate and the sustainable fishing practices they employ. HB MDC has also supported an Oceanwatch Cleanup Day in SA and has established a website link of videos highlighting SA fishing practices. (See Appendix 8: Where does our Seafood come from? DVD)

MDC Volunteers are visiting other MDCs eg HB MDC – Bunbury DDC, QMDC - NMDC. This is another area for future growth, as many volunteers also travel around Australia.

The MDCA members have provided comment on FRDC plans, provided photographs and stories for FRDC’s FISH magazine, provided support for the Seafood Conference Exhibition and Seaset activities. In 2011 MDCA representatives have taken an active role in FRDC’s Extension and Adoption workshops.

The project was also highlighted at several national and international conferences by:

- Tim Hoile, Project Manager, at the International Pacific Marine Educators Network Conference (IPMEN) held in Fiji in 2010.
- Phil Coulthard, Dolphin Discovery Centre, at the Global Eco Asia-Pacific Tourism Conference in Noosa, Qld in 2010.
- Pam Elliott at the Marine Teachers of Queensland Conference held in Launceston, Tasmania in 2011.

Benefits and adoption

The MDCA network now has a national presence as a recognised entity, with a logo and a website that has been made possible with FRDC funding. The website which functions as a first point of call for many people interested in the marine environment. The MDCA website is achieving a daily average of 35 visitor sessions with an average of 98 page views per day, which is steadily increasing. The main topics of interest for visitors include marine education, employment and volunteering opportunities with several enquiries received each week.

Communication between members has improved with more discussions via email and through the members' forum on the website. This was particularly important whilst discussing project activities i.e. website, models, science equipment, special project activities etc.

A more structured approach to coordination of the network has been implemented. Following the facilitated discussions at the 2010 Eden workshop, an executive committee has been elected to enable sharing of leadership roles in the network. Whilst this structure has been put in place, a degree of informality has still been maintained. The executive committee (Pam Elliott WMDC and Harry Thorman QMDC) has drafted a discussion paper for members outlining a clearer mission and definition of MDCA, as well as roles and responsibilities of members and protocols for communication and future priorities. This was ratified at the Hastings Point workshop.

Sharing strategies for volunteer management has been most helpful, with several centres implementing ideas discussed at the 2008 MDCA meeting at Woodbridge. Activities, resources and ideas from MDCs have been shared eg NMDC has adapted a plankton education activity originally from WMDC.

Most of our MDCs have a quarterly or monthly Newsletter which is distributed to their supporters. As an example HB MDC has 393 supporters who receive their "Discovery News". Special projects have proven to be a great success for the network. They have enabled each centre to learn from others and improve on areas of need. The reports from these experiences have also been valuable, allowing all MDCs to learn from each other's activities. Many of our MDCs suggested that their experience could have been even more valuable if they could have spent more time with their host MDC.

Examples of feedback that demonstrate the benefits of the MDCA network include:

"I attended the "wonders of our Oceans" expo in Melbourne and saw your fabulous interactive fisheries game working as part of the FRDC stand. I'm wondering if it is possible to get a copy/licence to use the game as part of our FRDC funded schools project?"

Fiona Ewing, SeaNet Extension Officer, Tasmania

"This new microscope is amazing – such a valuable tool"

Secondary Teacher, visiting WMDC

Further Development

Although MDCA members need to continually improve their displays, interactive experiences and science education activities offered to their visitors, most of our MDCs remain under-resourced. Improving visitor understanding of climate change, stormwater drainage, catchment management and sustainable fisheries management are some of the priorities for member centres. Whilst interactive models and specialised scientific equipment make visually appealing and practical additions to the centres, MDCA could have even more impact on community awareness and education with more resources.

MDCA members need to improve community awareness and understanding of fisheries and marine scientific research and the seafood industry, which can be achieved through knowledge and understanding of FRDC programs. MDCA members will continue to develop and deliver education programs and activities, supported by resources such as FISH magazine, which will increase visitor awareness and understanding of fisheries management issues. The MDCA has enormous potential to provide significant changes to public perception.

The Federal Government's implementation of the Australian curriculum provides MDCA with an excellent opportunity for members to develop activities and programs that are linked to the new curriculum outcomes. Our network has many capable educators who have the professional skills to develop outstanding curriculum outcomes linked to the new Australian curriculum. There is potential for MDCA to work with the Primary Industries Education Foundation in this area.

MDCA aims to be a major contributor to FRDC's Extension and Adoption Program. MDCA members are in a unique position of being able to provide information and educate the community in an engaging manner. Collectively the Centres attract 160,000 visitors annually. Whilst each centre now has a range of new resources to support their education programs, there is a much greater opportunity to extend sustainable fishing messages to the community. MDCA is now in an excellent position to grow and build the network, with another three or more MDCs that we are aware of, ensuring that MDCs applying to join the network have the appropriate programs and resources in place, and deliver a consistent message, or are able to develop these resources through seeking funding opportunities such as those provided by FRDC. The Central Coast MDC has joined the MDCA and has attended the last two workshops.

The MDCA website has initially provided a portal to the network, and further development will ensure that it becomes a bigger asset.

MDCA needs to build on and continue the relationship with FRDC, SeaNet network and others, particularly with a new MDCA leadership team in place. The foundation has been laid for all members to work with and support FRDC.

MDCA needs to continue to strengthen all MDCs through the support of the network. This can be achieved through a range of strategies that may include, but not be restricted to:

1. building a sponsorship base for all MDCs
2. seeking to widen the network with new membership
3. improving marketing skills by utilising the strengths of members eg Bunbury DDC.
4. continuing to build positive and supportive relationships through the network with more centre-based projects
5. assessing areas that need improvement within the network and within individual MDCs and work on those areas.
6. balancing the needs of each MDC whilst adhering to general consensus.
7. continuing to improve communication within the network.
8. continually seeking to provide inkind support to sponsors such as FRDC, above and beyond the objectives of funding grants eg provide comment on strategic plans, providing photographs and stories for media opportunities, conferences.

9. sharing grant applications and ideas amongst member centres
10. utilising the strengths of each MDC and follow their example where appropriate eg Sapphire Coast have a proactive Board.
11. improving the efficiency of the network whilst enabling all members equal opportunity to voice their opinion.
12. recognising that MDCA members are hard-working, passionate educators who are generally time poor and investigating ways that the network can support and address this issue.
13. continuing to recognize the importance of support from outside the network and build on relationships with key stakeholders such as FRDC.

Planned outcomes

The Planned Outcomes from this project were:

- increased capacity to deliver messages on the marine environment.
- increasing community and consumer support for the benefits of the fishing industry.
- an informed community and consumers about the health effects of seafood.
- raised awareness of the economic, environmental and social benefits arising from the industry; including an understanding ways in which the fishing industry supports communities in rural and regional Australia.
- raised awareness of the significance of the fishing experiences which people enjoy.
- raised awareness of FRDC as the leading agency for marine R&D in Australia.

This project has made a significant step towards MDCA's ability to change the community's perception of the fishing in Australia. FRDC has recognised that much more needs to be done in this area and our MDCs are in an excellent position to support FRDC's community education initiatives. Furthermore, given the wealth of evidence that highlights how important children are in changing their parents' views, and given that most of the MDCA members have a strong school education focus, MDCA is in a very strong position to support FRDC research and positive sustainability messages. This project has achieved these outcomes through the following ways.

1. MDCA has been able to promote FRDC principles through this project utilising the new website, interactive models including design and development, science equipment, a DVD presentation, a marketing conference and project opportunities. This has assisted MDCA to deliver consistent messaging in a cost-effective manner. The MDCA has continued to support each member of the network.
2. FRDC research outcomes and sustainability messages, as well as FRDC support, have been promoted to MDCA visitors through FISH magazine, public events and representation of MDCA at national and international conferences.
3. These activities and new resources have provided increased capacity to deliver messages and increased support for the benefits of the fishing industry.

FRDC is being strongly promoted as the lead agency for Marine Research and Development in Australia through the MDCA.

Conclusion

The members of MDCA have embraced this exceptional opportunity to evolve. The network has exceeded the planned outcomes and has made a number of additional contributions to support FRDC.

MDCA has shown that they have the expertise to develop world-class, innovative projects, both individually and collectively. However, many other organisations have been able to gain far more funding than what MDCA has so far achieved, and are consequently in much stronger positions. Improved marketing, gaining further external funding and improved reporting are areas for growth that all MDCs could benefit from.

MDCA needed to become a more established entity and FRDC recognised this and provided the support to make the first, significant step. A strong national network is a significant advantage for the member MDCs. MDCA has enormous potential and with good planning and support, each MDC has a stronger future.

One of the main principles of the network has always been to strengthen each MDC so that they have a stronger chance of long term survival. This project has shown FRDC and other agencies that we are professional, well organised centres, capable of producing quality projects and importantly, can adhere to timelines.

Areas of growth have included:

- communication;
- sharing more resources;
- promotion of FRDC principles;
- greater understanding of aquaria needs;
- marketing strategies; and
- ideas for ‘discovery learning’.

Given that MDCA is a national network, with a number of member centres located in rural and regional Australia, electronic communication via email has been crucial to this project. This has allowed all members to participate in:

- democratic decision-making;
- constructive group discussions;
- surveys;
- providing comments on models, science equipment & draft plans; and

- providing suggestions for milestone reports.

Members have also utilised direct telephone calls to discuss various issues and ideas, and this has aided teamwork and camaraderie within the network.

There are now eleven centres as part of the MDCA, with our newest members including Thursday Island, Qld, and Central Coast, NSW. Every state in Australia has a representative. This is an excellent achievement for the network. This provides MDCA with an excellent platform which the network will be able to grow as a group and as individual MDCs. The support of FRDC has made a significant contribution to this achievement.

MDCA has valued the network opportunities, particularly with:

- Developing ideas for centres for discovery learning
- Curriculum development
- Engagement of community
- Volunteer management
- Funding opportunities
- Interactive models
- Science experiments
- Sharing resources

In closing, I'd like to include Phil Coulthard's, Bunbury DDC comment:

"I think we turned the corner once FRDC sponsorship was secured, possibly a little premature for most of us, however the opportunities are clearly there if we ride on the same seat, in the same carriage and on the same train (call me a Philosopher if you wish)."

Phil Coulthard Operations / Marine Biologist

Gaining this FRDC project grant has been a catalyst for significant improvement across the network. Members have realised the value of being part of a national network and have given it a much higher priority. Communication has become more consistent, some members have taken on leadership roles within the network, whilst others have offered to share the workload through writing funding submissions. The direction of the MDCA is changing and the responsibilities are being shared.

MDCA is very grateful to FRDC for providing funding that has given the network opportunities for growth and development. The FRDC staff has been very supportive, in particular Julie Haldane, Peter Horvat and Jo Ruscoe.

The MDCA network is a cost effective method of delivering effective marine environmental education to large numbers of people across Australia. Current visitation for the MDCA Centres is 160,000 visitors annually, with the potential to grow considerably. The formation of MDCA has provided the centres with an opportunity to work together collaboratively on key issues, with a goal to having a cohesive approach and set of key messages on marine education.

References

- i) 2-May-11 - Survey - Community perceptions of the fishing industry in Australia"
<http://www.frdc.com.au/AnnouncementRetrieve.aspx?ID=49942>

ii) FISH Magazine Dec 2010 edition FRDC

Appendix 1: Intellectual Property

The "Fish Forever" interactive model plans are the intellectual property of MDCA & FRDC.

The virtual fish dissection DVD:

- Final render images, video and audio outputs are the intellectual property of the Department of Fisheries, Western Australia.
- Final DVD presentation is the joint intellectual property of Department of Fisheries, Western Australia and FRDC."

Appendix 2: Staff involved with the project

The following staff that have been involved in the project:

- Ballina (High) Marine Discovery Centre: Mick O'Connor & Lynda Hourigan
- Henley Beach Marine Discovery Centre (Henley Beach, SA): Tim Hoile & John Agnew
- Dolphin Discovery Centre (Bunbury, WA): Phil Coulthard
- Hastings Point Marine Discovery Centre (Hastings Pt, NSW): Kerrie Trees
- Thursday Island Marine Discovery Centre (Thursday Island, Qld): Andrew Denzin
- Bondi Marine Discovery Centre (Bondi, NSW): Will Jones
- Woodbridge Marine Discovery Centre (Woodbridge, Tas): Pam Elliott & Ros Asten
- Queenscliff Marine Discovery Centre (Queenscliff, Vic): Philip Armato, Alex Giannuzzi, Pam Haebich, Hilary Bouma, Bobbie Liebscher, Julie Murphy & Travis Lee
- Sapphire Coast Marine Discovery Centre (Eden, NSW): Jenny Robb, Steven White & Sheree Epe
- Naturaliste Marine Discovery Centre (Hillarys, WA): Michael Burke, Bruce Mackay, Sandy Clarke, Michelle Youngson, Linda Wiberg and Michael Burgess

Article highlighting MDCA supporting FRDC from Dec 10 edition of FISH



13

EDUCATING SUSTAINABILITY STREET STYLE

Often the best forms of education are those that are fun. This was the thought behind the sea snakes and ladders game trialled by the FRDC at the International Seafood and Health Conference in Melbourne in November.

The FRDC, OceanWatch and Marine Discovery Centres co-hosted a trade booth at the conference, where the focus was educating children about science, marine life and sustainability. The space and activity at the conference allowed children to have some fun and learn at the same time. The sea snakes and ladders game was especially popular.

The messages used in the game were refined with input from the Marine Discovery Centres and OceanWatch. The basic game-board format was overlaid onto an estuary scene and developed at a manageable size. It was then upsized to the large format, measuring three metres square.

The game provided a variety of simple messages for the children playing, such as don't leave your rubbish behind and research helps underpin seafood sustainability. It also gave those running the game an opportunity to engage with the children and reinforce the messages verbally.

In addition to the game, the FRDC developed a set of 10 fun stickers for use with the game. Each sticker contains a message that reinforces the messages of the game.

The FRDC has produced two prototypes of the sea snakes and ladders game, which will find new homes at the Queenscliff Marine Discovery Centre and OceanWatch Australia.

– JULIE HALDANE

Appendix 3:

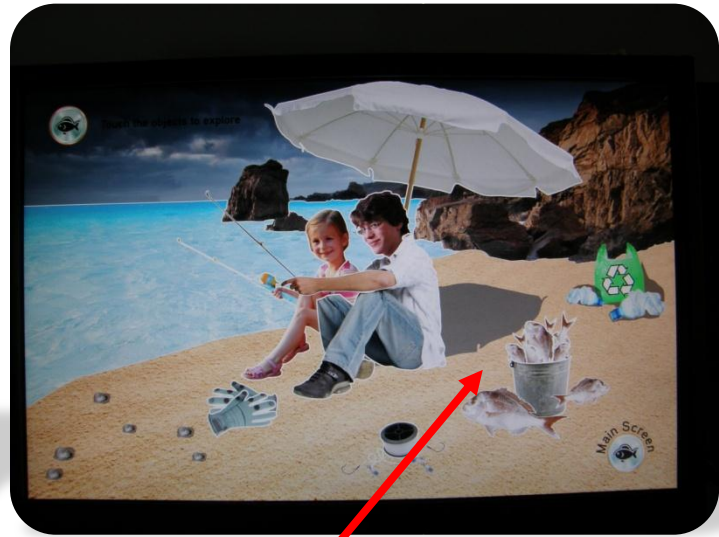
FRDC Model

Our latest model, “Fish Forever”, was developed through the support of FRDC for our National MDC network.

It includes options for Commercial and Recreational Fishing, utilising a touchscreen. This model also highlights Australia’s outstanding management of commercial fisheries. Ballina, Bunbury, Queenscliff and Henley Beach MDCs were fortunate enough to receive this interactive as part of FRDC’s support.



Touch the objects to explore (first section).



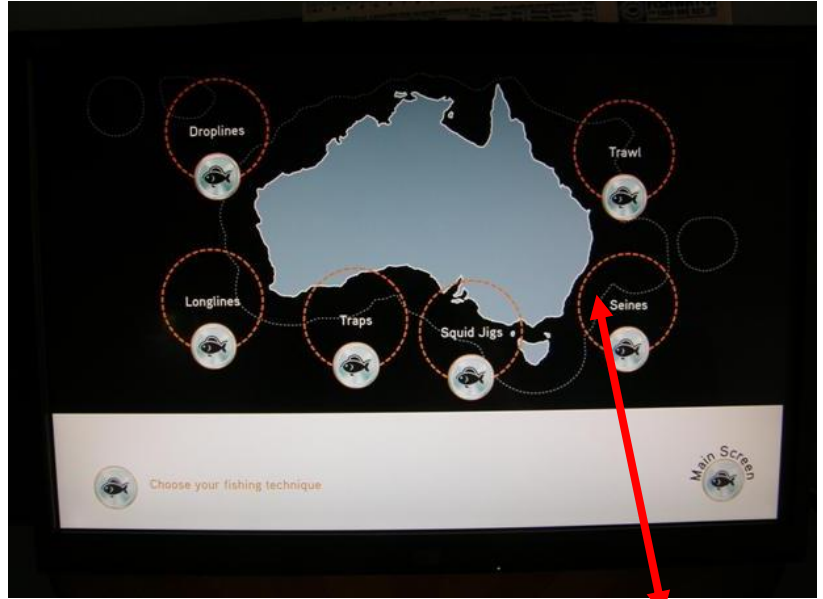
Touchscreen eg. the buckets with fish



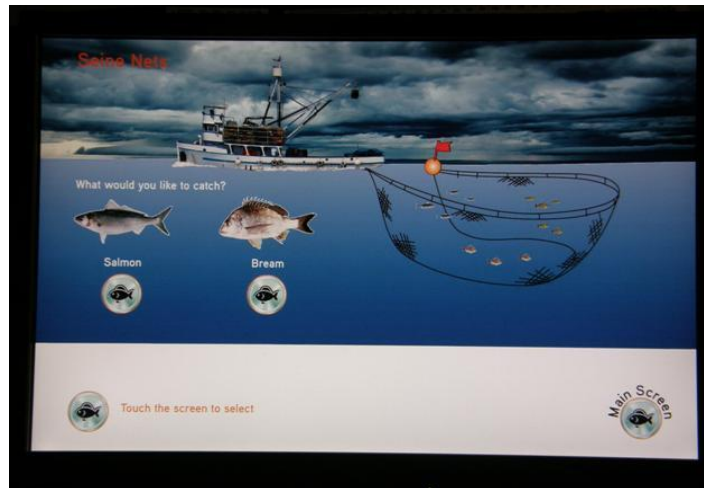
A question appears for the user to answer



Touch the objects to explore (second section). Nets".



Touch the objects you like to find out more, eg "Seine Nets".



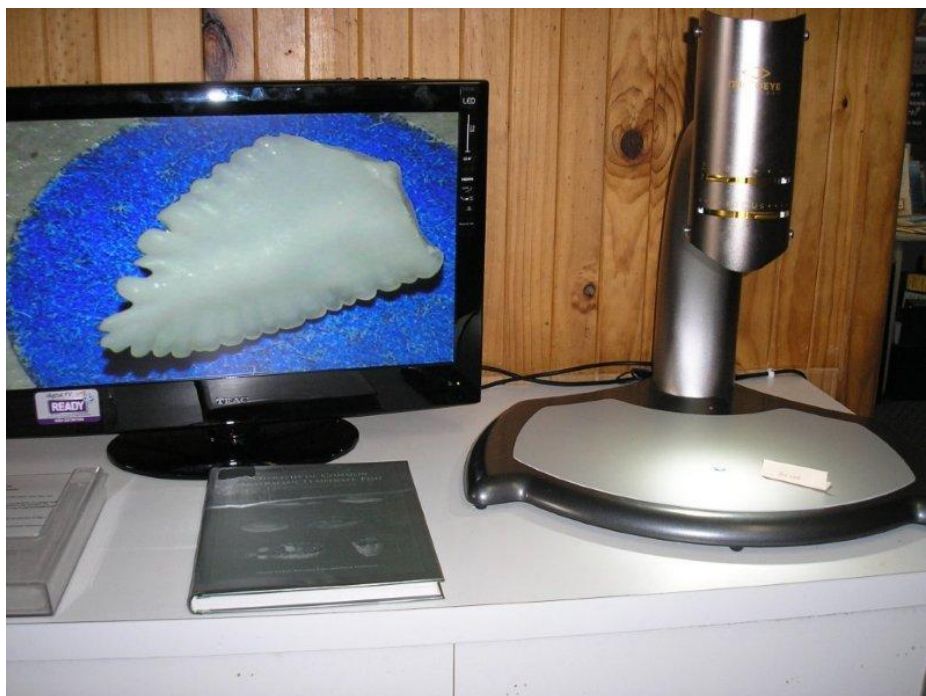
"What would you like to catch? A Bream?"

This article is from "Discovery News" by HB MDC

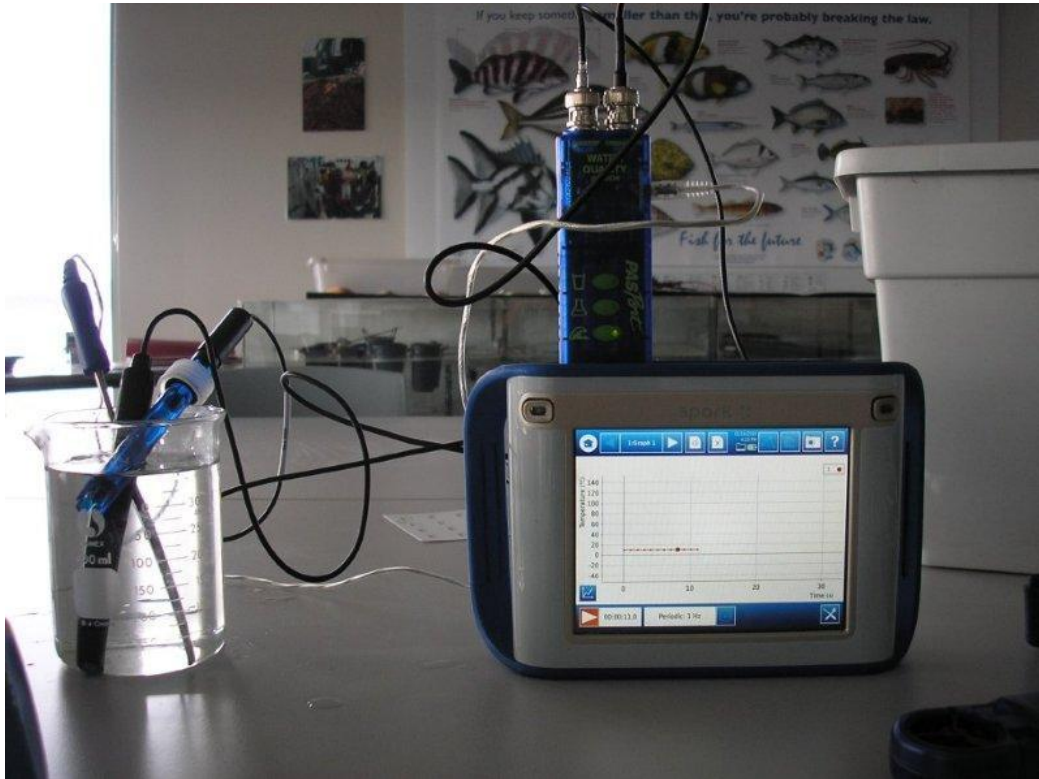
Appendix 4: Photographs of science equipment sponsored by FRDC in-situ at Woodbridge MDC



Microscope and video camera set up in the primary classroom for plankton viewing



microEye and screen enabling students and visitors to explore marine organisms.



SPARK data logger and sensors for pH, temperature and conductivity.



FRDC sponsored science equipment at WMDC

Appendix 5: An Article from Henley Beach MDC “Discovery News” highlighting TI MDC’s visit follows:

Thursday Island MDC visits Henley Beach MDC!

On Thursday 9th September, Thursday Island MDC visited our MDC. MDCA member, Andrew Denzin, utilised his special project opportunity to view the MDC, see the interactive models first-hand and have a guided Marine Trail viewing the interpretive signage. Governance Structures, Strategic Planning, Sponsorship, Funding, website development and learning activities were also discussed. Andrew brought Matthew Denzin, Assistant Principal, and Frank Loban who heads Marine in the TSRA (Torres Strait Regional Authority).

Andrew recently won the QLD Green teachers award which was presented in Japan. Andrew is a member of our MDCA and co-ordinates an outstanding marine education program across the TI schools.



Representatives from Thursday Island MDC visiting staff at the Henley Beach MDC.

Appendix 6: Model Surveys (raw data)

Lynda, Mick, Ros, Pam

Model

1. What features would be valuable to have for the model?

- ability to change the program / multi-media
- interactive / hands on for kids to use
- physically interactive
- content / message needs to be simple & nationally relevant
- at the end of the activity a printout that the kids can take home

2. What would you like to see on the graphics of the model?

- simple, clear, colourful
- diagrams & pictures rather than words
- not too cartoony → more true to life
- a bit of video as well as static graphics

3. Would you be happy for a touch-screen as part of the model?

Yes

4. Is there anything you would like to contribute?

Fish measuring models	Personal responsibility / actions examples
Bycatch mitigating models	
Population modelling exercise	Seafood Guide
Seafood Cafe from Monterey Bay	Nutritional info - omega 3's
Conservation Issues	

5. Suggested title for the Model: eg Fish Forever

(John A, Phil C.) AUDIENCE = CLIENTS

Model

1. What features would be valuable to have for the model?

DURABILITY, COLOR(S)

Relevance to audience

FUN + MESSAGE

2. What would you like to see on the graphics of the model?

- Glossy Images
- Use screen images mixed with actual props!

3. Would you be happy for a touch-screen as part of the model?

YES - needs to be engaging.

What's the alternative?

4. Is there anything you would like to contribute?

5. Suggested title for the Model: eg Fish Forever



Interactive model

Model

1. What features would be valuable to have for the model?
web based? Can be interactive (smartboard?)
- has to connect to the audience
→ together with a 'hands on' kit. in the form of a tackle box
2. What would you like to see on the graphics of the model?
Develop brief 1st - then go to designer
3. Would you be happy for a touch-screen as part of the model?
Up to the individual centre.
4. Is there anything you would like to contribute?
5. Suggested title for the Model: eg Fish Forever ✓

could be web-based so that it can be an interactive display if the centre had room, or for use on private computers if the " " no room.

Complementing the website could be a 'hands on bit' in the form of a tackle box, with examples of 'good' + 'bad' rec. fishing & practice ??

Model

1. What features would be valuable to have for the model?

Handson - touching, feeling, smelling - senses.

Something children would not be able to access at school.

Need to consider different ways in which students learn.

What works: touch tanks, dress ups, doing an activity in the env.

2. What would you like to see on the graphics of the model?

General themes: habitats

marine protection

catchment issues

fisheries sustainability

3. Would you be happy for a touch-screen as part of the model?

No, they can do that at school / home.

Touch screen could be one of the models but not all.

4. Is there anything you would like to contribute?

We are concerned about the cost of touch screens / interactive models.

5. Suggested title for the Model: eg Fish Forever

Model

1. What features would be valuable to have for the model?

- multi sensory. eg. graphics, something to pull/push/touch, audio ? smell.
- multi levels; - focus on associated ed program to be developed also.

Suggested: Rather than multiple model replicas - perhaps invest in ~~the~~ really good ones that could travel to various centres.

2. What would you like to see on the graphics of the model?

- Heavily dependent on final subject. e.g. climate change,

3. Would you be happy for a touch-screen as part of the model?

It could be an added value component.

4. Is there anything you would like to contribute?

Perhaps develop programs/activities from individual centres then use them as a pool for the final model.

5. Suggested title for the Model: eg Fish Forever

Not suitable.

At this point - would depend on content.

Appendix 7: High-level Science Materials Wish List (raw data)

Item	Organisation	Contact Details	Price
Video-flex	555 Electronics	19 Kensington Street Clovelly Park South Australia 5042 Phone:- 08-82778936 Fax:- 08-81772185 e-mail to:- bwigley@senet.com.au web site:- www.555electronics.com.au	Videoflex 7600 \$1,100+ GST with carry case & much more.
- Equipment to complete our old aquaculture ponds (pumps, pipe, filtration material, fish, feed) - large display fish tank - touch tank - 2 x video & 3 x dissection microscopes - data projector for multimedia displays	Andrew's possibilities		
Data loggers	Kerrie's suggestions: SPARK SLS datalogger including temperature and voltage Water quality sensor (temp, pH, Dissolved Oxygen, conductivity and Turbidity Humidity/air temp/dew point . OR Labquest Vernier ...details still to be established but similar packages available with computer interface options	PASCOaustralia Doug Bail < db@ciderhouse.com.au >	\$1550 each x 2
Prepared Microscope Slides and charts	Southern Biological supplies		Up to \$300
Field microscope to bring back images from the day	ViTiny is a hand held, portable digital microscope with colour LCD and it's the same size as a mobile phone	The microscope- shop.com.au	Price Ex GST: \$250.00 , Price Inc GST: \$275.00 x 2
Stereo microscope to hook up to existing camera	MWPETF 35	Contact us for a custom quote! info@microscopeworld-	\$699.00 x 1

	<u>Meiji Stereo Microscope Package MWPEMF</u> Meiji stereo microscope package with fluorescent ring light. Your choice of 10x, 20x, 30x or 40x magnification.	<u>professional.com</u>	
microEYE DISCOVERY videomicroscope complete with plinth, power supply, video lead and instructions (very durable)	Will's suggestion	Micro Imaging Ltd P O Box 74489 Market Road Auckland NEW ZEALAND	Price (for one unit): A\$ 3785.00 (FOB) each Price (for two units): A\$ 3595.00 (FOB) each
video-microscope	Jen's suggestion		
<ul style="list-style-type: none"> • 1-2 stereo microscopes with video cameras for individual or whole class viewing of small wet or dry samples • two quality microscopes with video camera for whole class plankton viewing • zoom camera on flexible stand for individual or small group viewing of larger dry objects (such as preserved fish etc) 	Ros' suggestions	a microscope supplier in Hobart	- still waiting for quote

Appendix 8: Where does our Seafood come from? DVD



We would like to thank **Nathan Bicknell** from OceanWatch SA/Seanet for the “**Where does Seafood come from?**” DVD presentation.

The series of short documentaries profiles individual local seafood sectors outlining generic information about modern techniques and management practices as well as factual information about the biology and ecology of commercial species.

OceanWatch/Seanet and MDCs are developing stronger relationships. This has been a significant growth facet through the project.

Appendix 9: Article from “Discovery News” highlighting a visit to HB MDC from Patrick Hone, FRDC Executive Director



Patrick was generous in his praise of the MDCA and valued the work of all MDCs.

Appendix 10: Media Article in FISH, June, 2011 highlighting the MDCA being supported by FRDC.

By Julie Haldane

More information: Sapphire Coast Marine Discovery Centre, www.sapphirecoastdiscovery.com.au

EDUCATION

Forum links community and marine science

A two-day forum at the Sapphire Coast Marine Discovery Centre in Eden, NSW, is providing an important touchstone between scientists and members of the community with an interest in our oceans and fisheries, whether it be fishing, recreation or environmental protection.

The theme of the weekend forum on 26 and 27 March was 'Food for thought', with almost 100 people attending on each of the two days. The general consensus among participants was that the forum was both informative and enjoyable.

Audience members included oyster farmers, school teachers, interested community members, environmentalists, people who dive or snorkel, retired scientists and tertiary students.

Six speakers provided a diverse range of presentations, from mapping seabed habitats, to Australian Salmon and Sardine fisheries, ocean currents, assessment and management of wild fish, and the biology and aquaculture of oysters and sea urchins.

Executive officer for the marine discovery centre, Jenny Robb, says there is so much that is still unknown about Australia's oceans and fisheries. "Mind you, there is a lot we do know, and it is just amazing to hear about it. That is the beauty of the forum," she says.

"Many people in the audience know quite a lot about the marine environment. We have found that every year, and question time is really interesting – the audience asks good questions."

Jenny Robb says there is still plenty of potential when it comes to providing information about the commercial fishing industry. Feedback from participants revealed that many people didn't realise the extent of research into fisheries, or that fisheries were even managed.

The Eden forum provides a valuable opportunity for researchers to present their research to the public. The event is expected to expand next year. "This was our third forum, and I think it is now time to ramp it up and get it to the next level."

Jenny Robb says she believes the general community, researchers and the fisheries industry can all benefit from the forum. **F**



Marine biologist Sheree Epe (second from left) with a family on a rocky shore ramble.

SPEAKERS AT THE FORUM

Alan Jordan – NSW Department of Environment, Climate Change and Water
John Stewart – Wild Fisheries Unit, Industry & Investment NSW
Kevin Rowling – Industry & Investment NSW
Ross Griffiths – Research School of Earth Sciences ANU
Jane Williamson – Macquarie University
Ana Rubio-Zuazo – University of Wollongong

VISION FOR MARINE EDUCATION

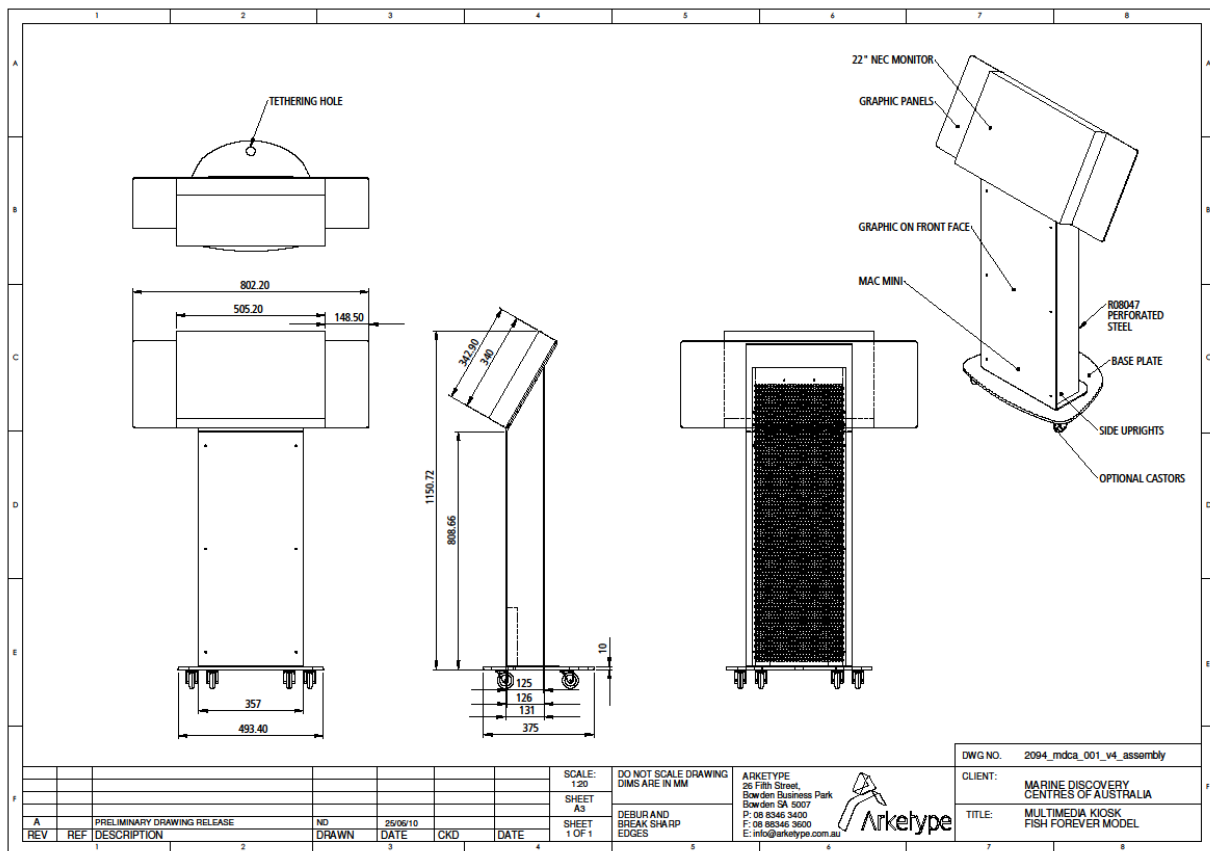
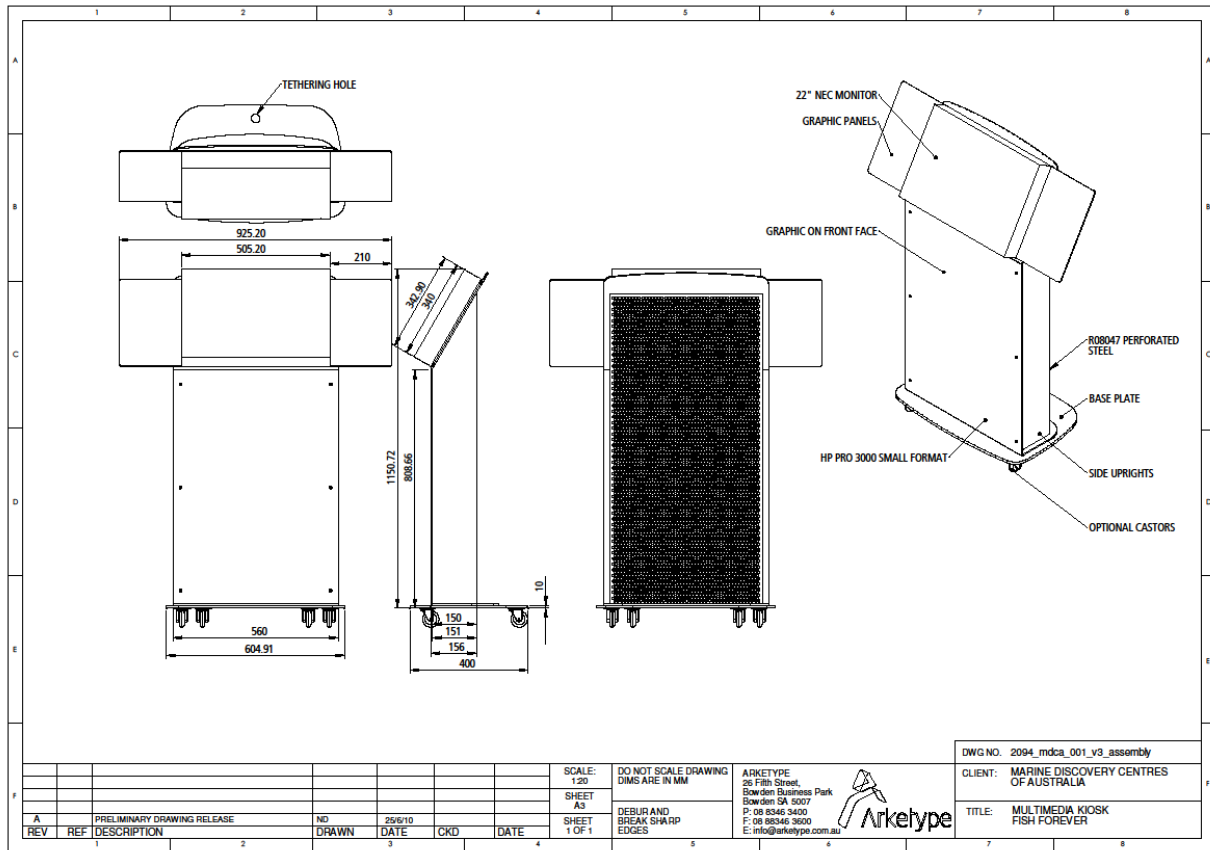
Four years ago the Sapphire Coast Marine Discovery Centre (SCMDC) did not even have a building. It was not until the end of 2007 that they managed to secure premises on the wharf at Snug Cove. The Marine Discovery Centre opened its doors in October 2008 and now has a display centre, marine education programs and a marine research laboratory.

Its staff includes an operations manager, a marine teacher, a marine biologist and executive officer. A host of volunteers also help out and the centre offers education programs for all

ages. Its facilities also support research into the marine environment and outdoor education programs. Established under The Eden Whale Discovery Centre Research Trust, and governed by a voluntary board of directors, the centre aims to become Australia's best temperate marine education and research centre.

FRDC supports the Marine Discovery Centre Australia national network, which includes the Eden centre. Events like the Eden forum provide an opportunity to showcase FRDC-funded research.

Appendix 11: "Fish Forever" Model Assembly Diagrams



Appendix 12: “Fish Forever” Screen Layouts follow

Fish Forever!



Touch the screen to continue

Sustainable Fishing

We all play a role in maintaining sustainable fishing. From the moment you cast your line at the local beach, to the fish you buy from the local fish and chip shop. Touch the screen to find out how we all can enjoy the benefits of sustainable fishing well into the future.

The Fisheries Research and Development Corporation (FRDC) is the national body charged with planning, funding and managing Research, Development and Extension (RD&E) for the fishing industry, delivering against the Government's priorities, and pursuing the adoption of RD&E for industry and community benefit.

It is uniquely placed, in that it deals with the Australian Government, industry and the research partners around Australia on both a strategic and operational basis. The FRDC is ideally situated to communicate and network with partners to leverage, and broker knowledge to get the best results from research and development for both Government and industry and the community.

For more information visit
www.frdc.com.au



Touch the screen to continue



Sustainable Fishing

We all play a role in maintaining sustainable fishing.

From the moment you cast your line at the local beach, to the fish you buy from the local fish and chip shop.

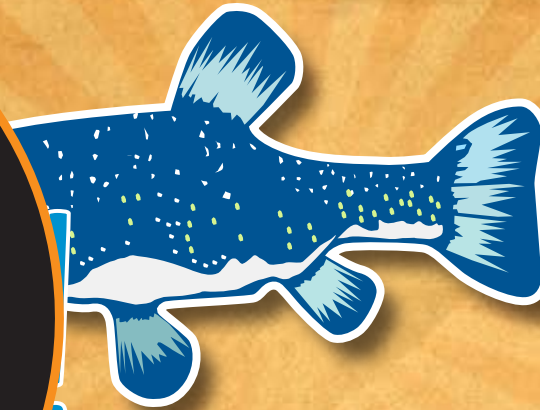
Touch the screen to find out how we all can enjoy the benefits of sustainable fishing well into the future.

Marine Discovery Centres Australia (MDCA) is a group that focuses on the discussion of key issues relating to marine and coastal environment conservation. The MDCA is a collaborative group formed out of the nation's Marine Discovery Centres.

Australia's Marine Discovery Centres use hands-on education to inspire visitors, and to help them discover and learn about Australia's extensive marine environments. Each centre is unique in origin: some are part of schools, while others are community or government-funded. For more information or to find a Marine Discovery centre in your area visit

www.mdca.org.au/

Close



Touch the screen to continue



Australian Government
Fisheries Research and
Development Corporation



Sustainable Fishing

We all play a role in maintaining sustainable fishing.

From the moment you cast your line at the local beach, to the fish you buy from the local fish and chip shop.

Touch the screen to find out how we all can enjoy the benefits of sustainable fishing well into the future.

Choose the section you would like to explore

Commercial Fishing



Recreational Fishing



Main Screen





Commercial Fishing

You are the skipper on a commercial fishing boat.
The choices you make have an effect on the entire ecosystem.



Touch the screen to continue





Where would you like to fish?



Touch a location on the map to continue





**Why don't you try
Australian Waters?**

Australia has a well managed
and sustainable fishing
industry!



Touch map to try again





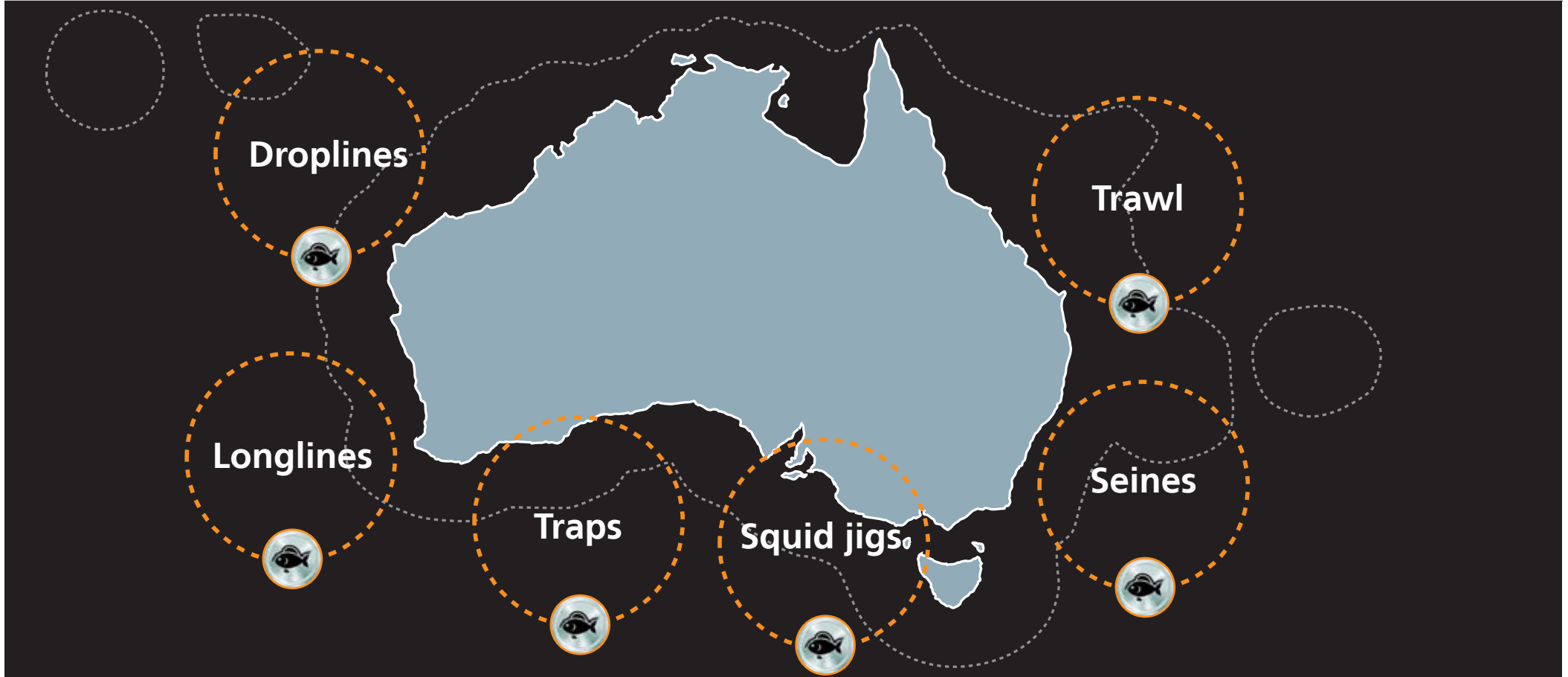
Australian Fishing Zone (AFZ)

Australia has one of the largest fishing zones in the world covering 12 million square kilometres.



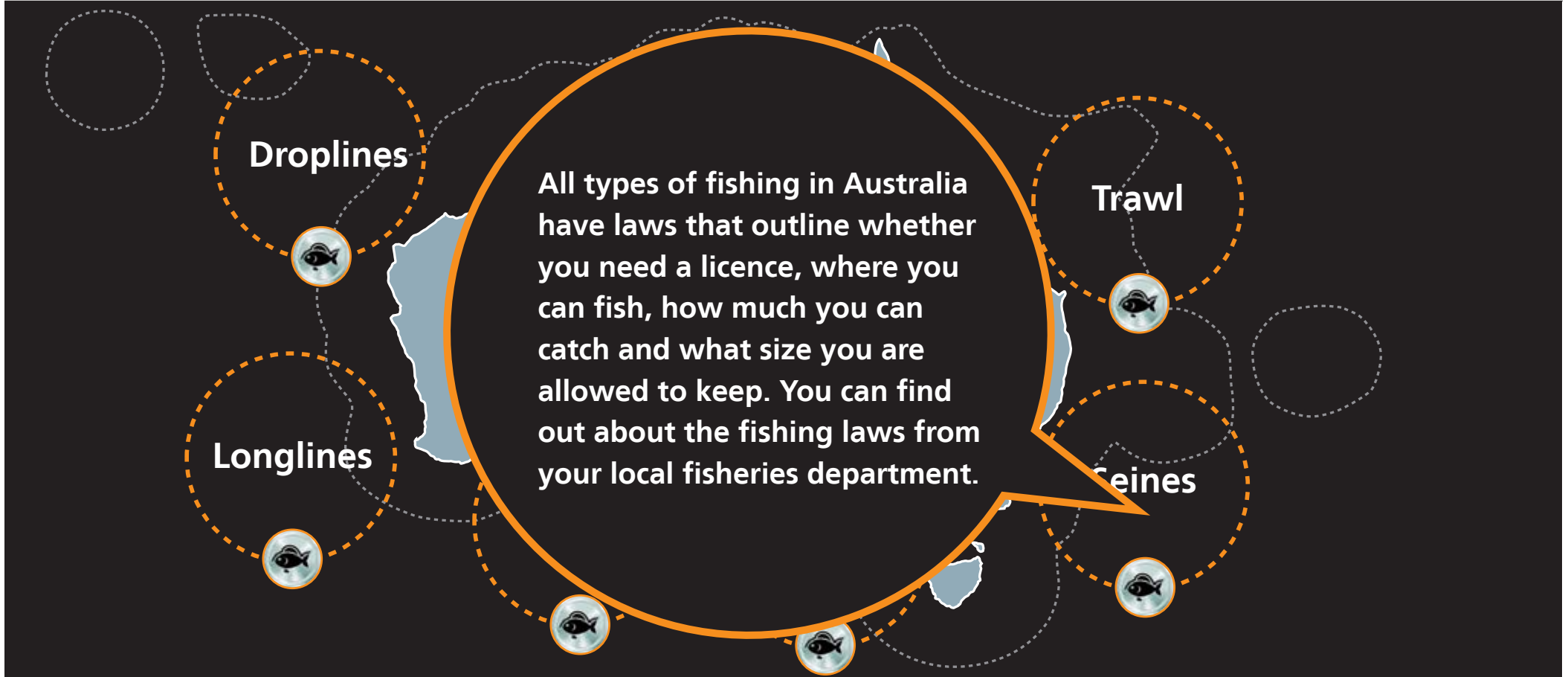
Touch to continue





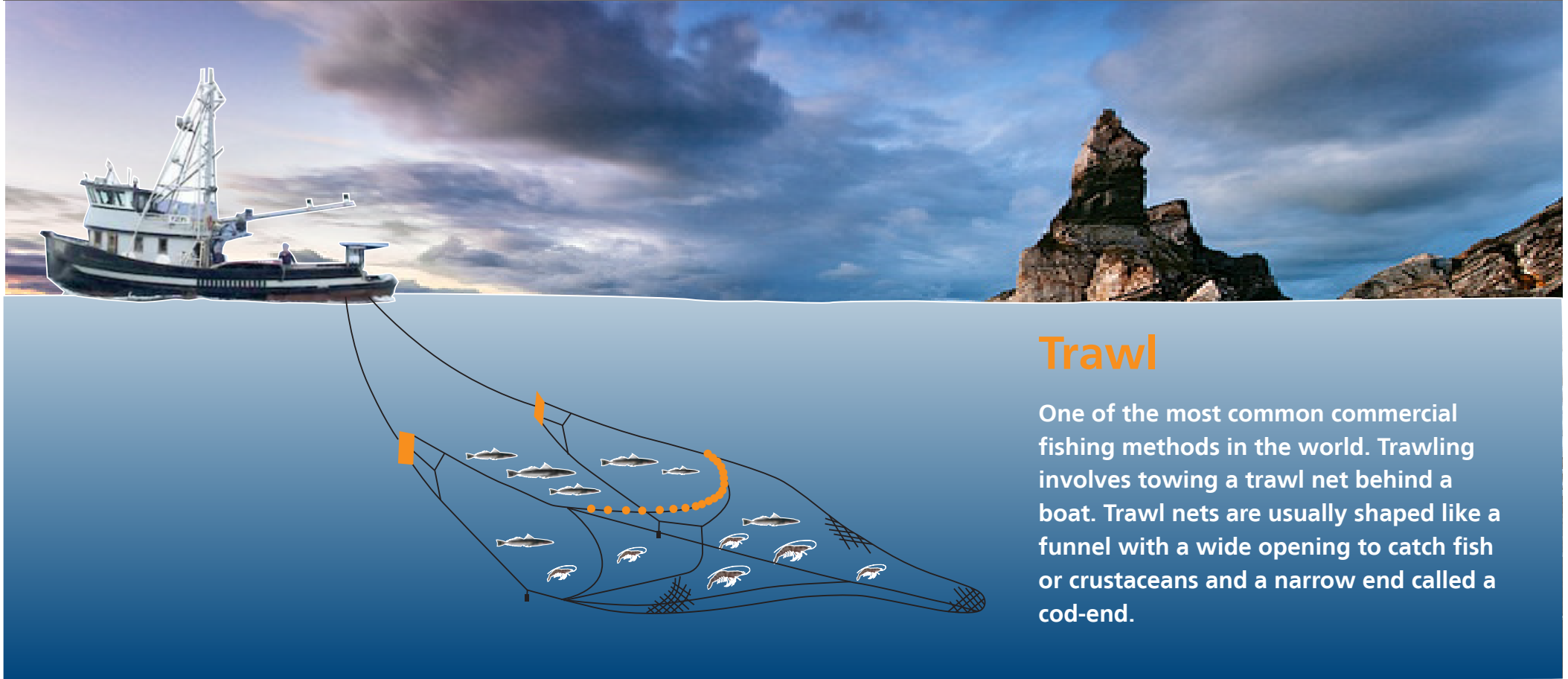
Choose your fishing technique





Choose your fishing technique





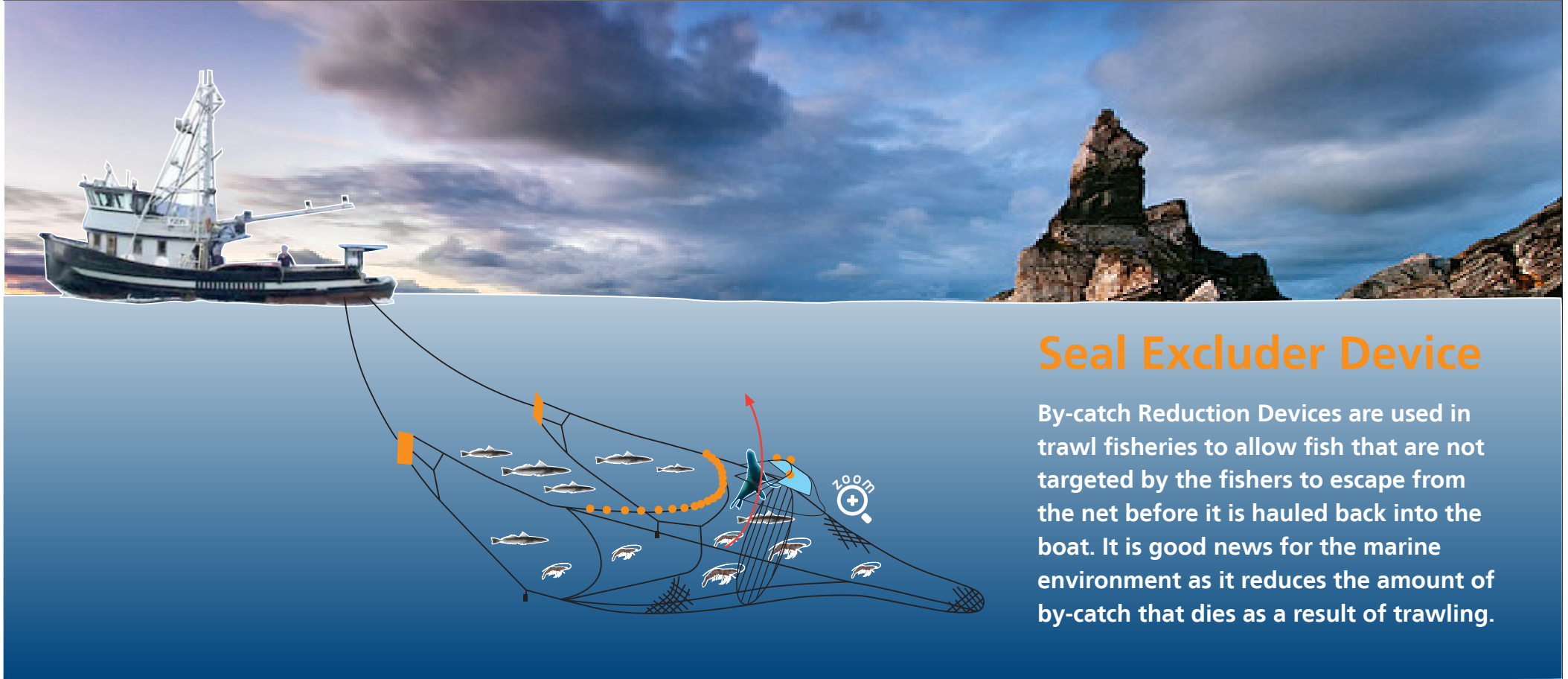
Trawl

One of the most common commercial fishing methods in the world. Trawling involves towing a trawl net behind a boat. Trawl nets are usually shaped like a funnel with a wide opening to catch fish or crustaceans and a narrow end called a cod-end.



Do you want to apply a by-catch reduction device?





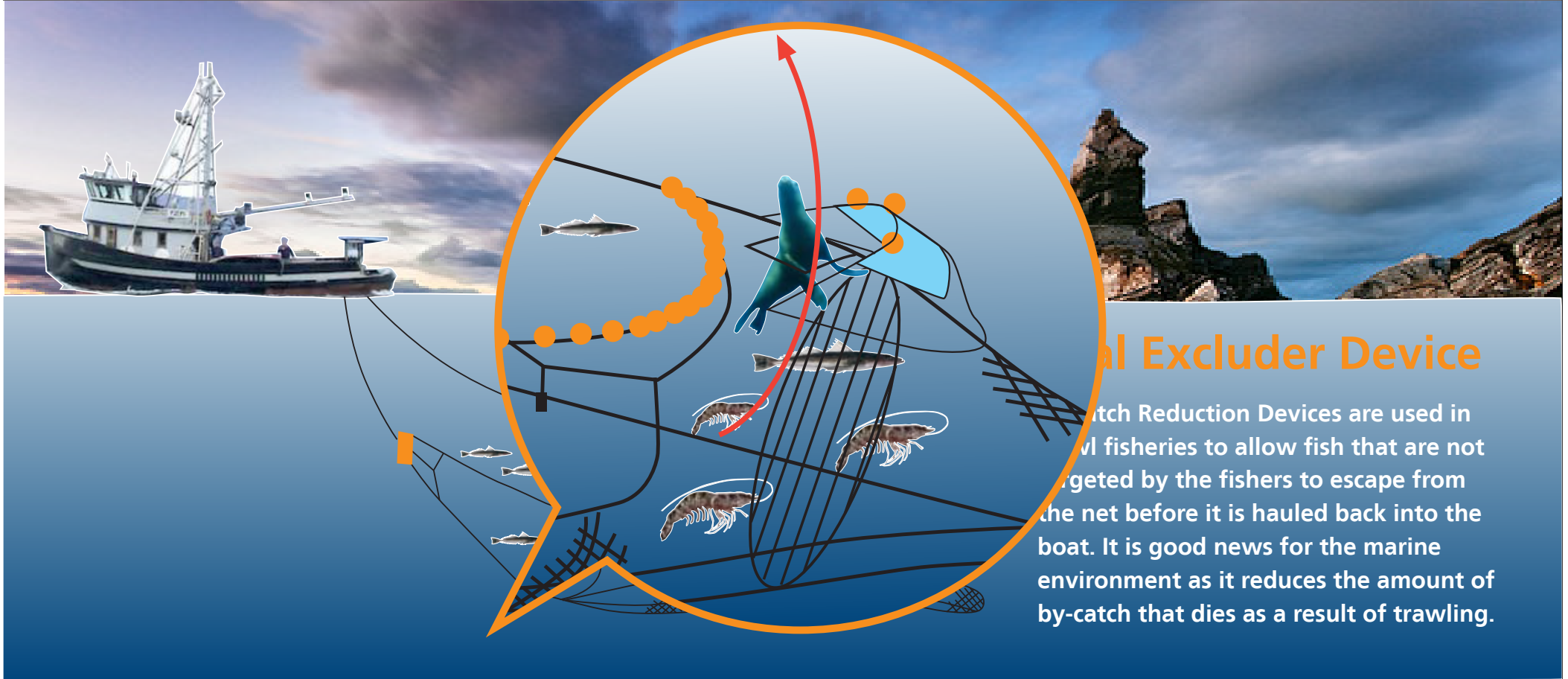
Seal Excluder Device

By-catch Reduction Devices are used in trawl fisheries to allow fish that are not targeted by the fishers to escape from the net before it is hauled back into the boat. It is good news for the marine environment as it reduces the amount of by-catch that dies as a result of trawling.



Touch the screen to zoom





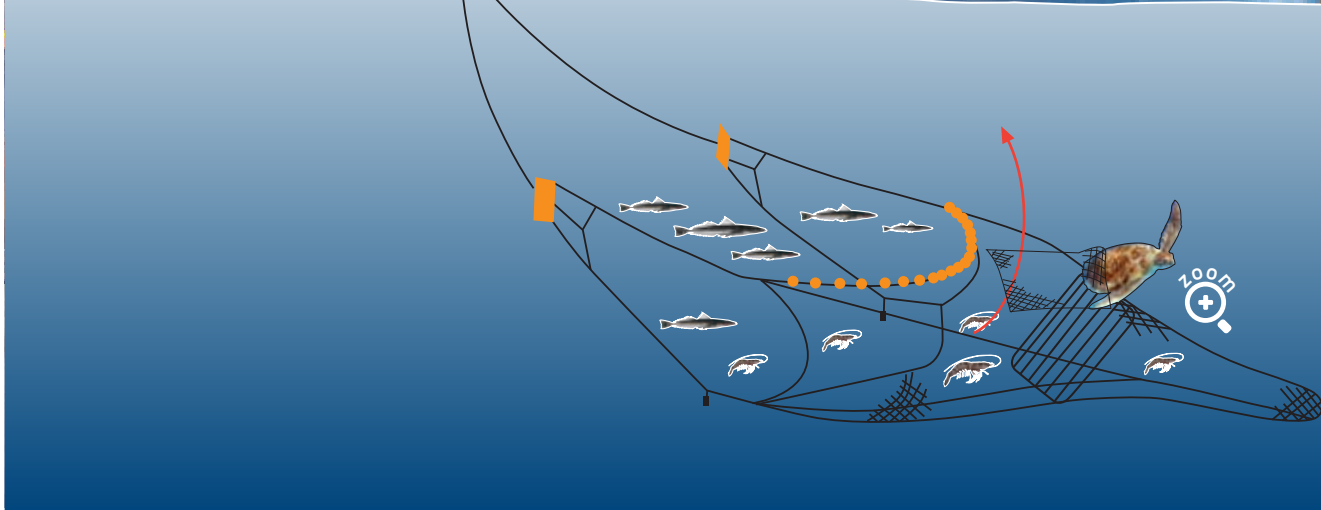
Fish Excluder Device

Catch Reduction Devices are used in trawl fisheries to allow fish that are not targeted by the fishers to escape from the net before it is hauled back into the boat. It is good news for the marine environment as it reduces the amount of by-catch that dies as a result of trawling.



Touch the screen to continue





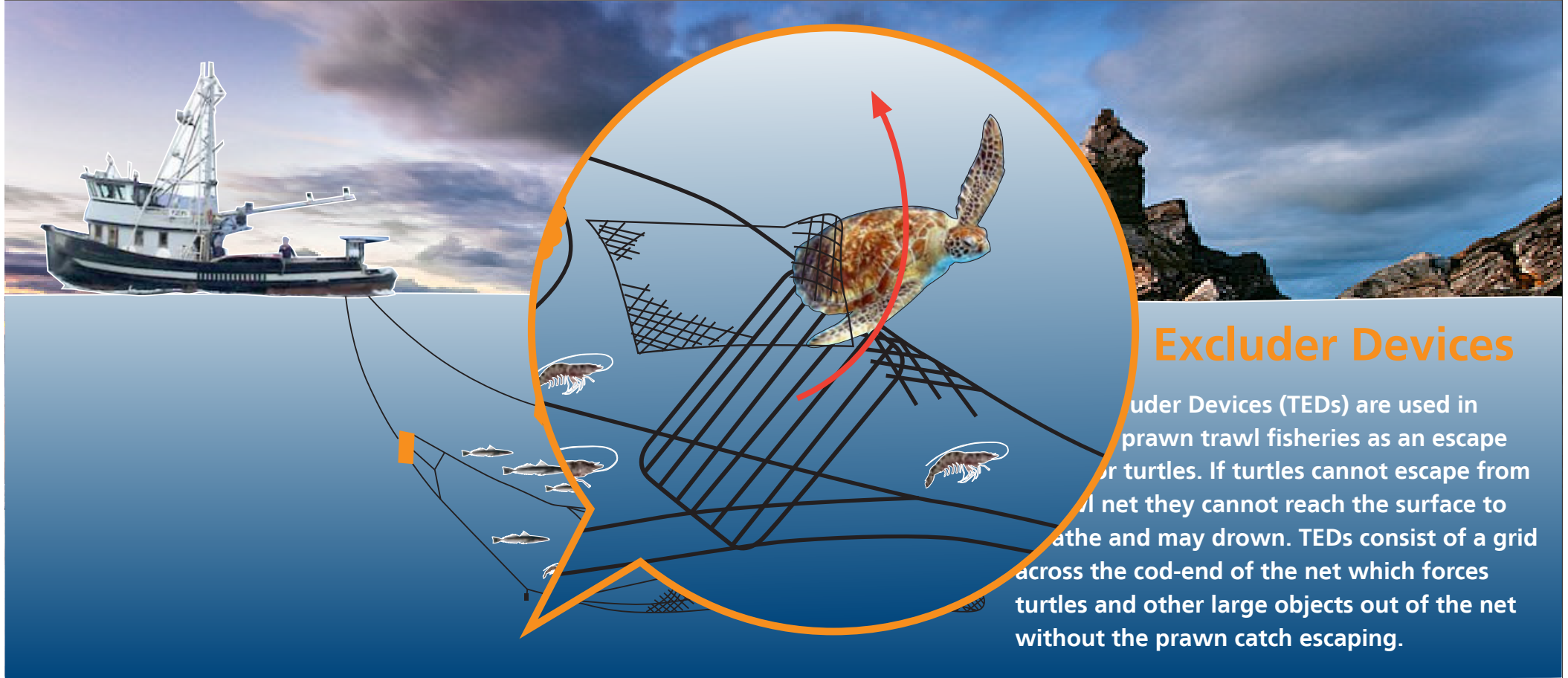
Turtle Excluder Devices

Turtle Excluder Devices (TEDs) are used in northern prawn trawl fisheries as an escape hatch for turtles. If turtles cannot escape from a trawl net they cannot reach the surface to breathe and may drown. TEDs consist of a grid across the cod-end of the net which forces turtles and other large objects out of the net without the prawn catch escaping.



Touch the screen to zoom





Excluder Devices

Excluder Devices (TEDs) are used in prawn trawl fisheries as an escape route for turtles. If turtles cannot escape from the net they cannot reach the surface to breathe and may drown. TEDs consist of a grid across the cod-end of the net which forces turtles and other large objects out of the net without the prawn catch escaping.



Touch the screen to continue



Trawl



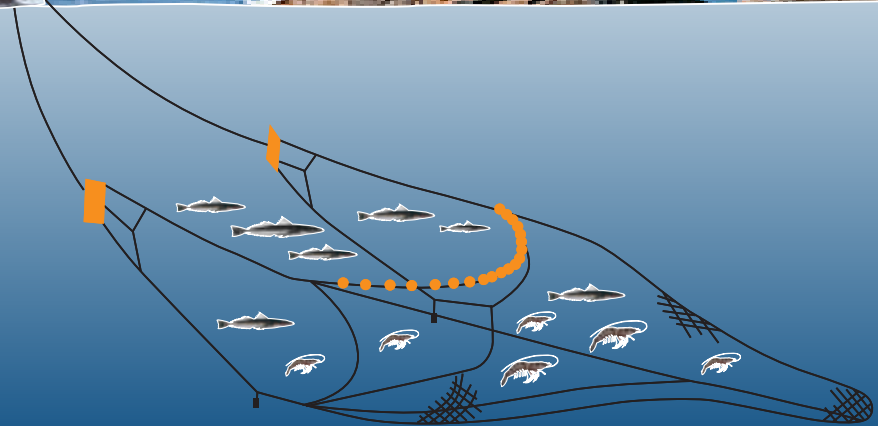
What would you like to catch?



Prawns



Flathead



Touch the screen to select



— Prawn —
Great choice!



10cm

King Prawn
Melicertus latisulcatus

Habitat

Saltwater and estuarine

Size

Larger than 10cm

Wild / Farmed

Wild

Edible parts

Flesh. The head and shell are also eaten in many Asian dishes.



Touch screen to return



— Flathead —
Great choice!



30cm

Tiger Flathead
Neoplatycephalus richarsoni

Habitat
Saltwater

Size
30-55 cm

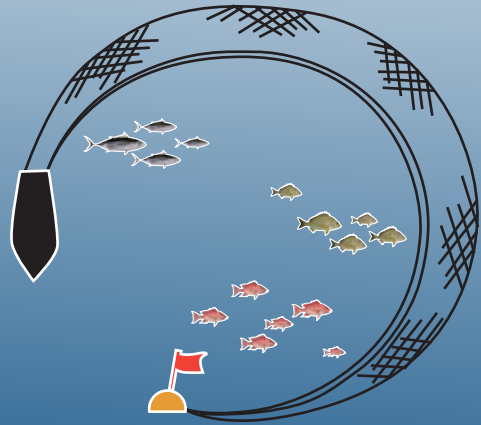
Wild / Farmed
Wild

Edible parts
Filletts



Touch screen to return





Seine Nets

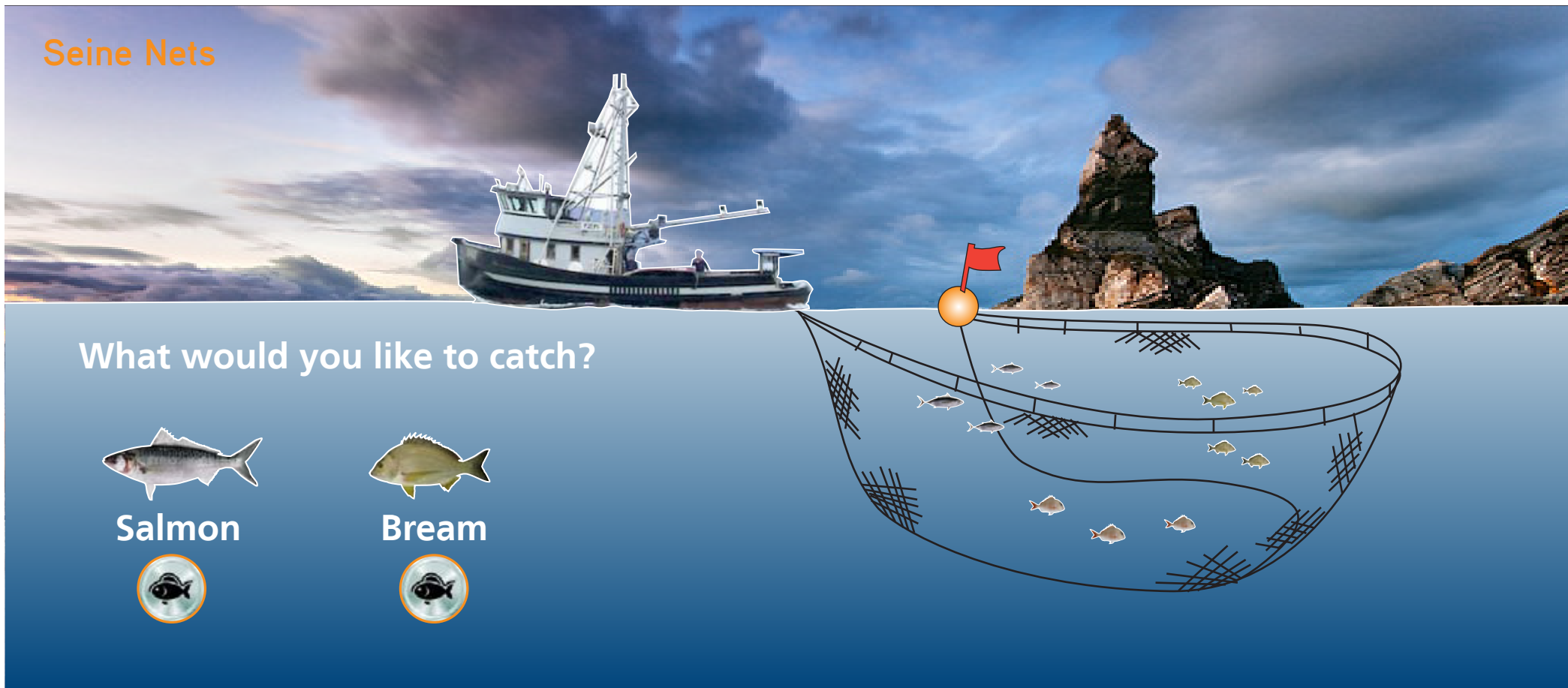
Seine nets are usually long flat nets like a fence that are used to encircle a school of fish, with either a person or boat moving around the fish in a circle. Purse, Beach and Danish seine nets are used in many Australian fisheries.



Touch screen to continue



Seine Nets



What would you like to catch?



Salmon



Bream



Touch screen to select



— Salmon —
Great choice!



50cm

Australian Salmon

Arripis Trutta

Habitat

Saltwater

Size

40 - 50 cm

Wild / Farmed

Wild

Edible parts

Fillets from the side of the fish



Touch screen to return



Bream
Great choice!



25cm

Yellowfin Bream

Acanthopagrus australis

Habitat

Estuarine and saltwater

Size

25-35 cm

Wild / Farmed

Mostly wild but with aquaculture potential

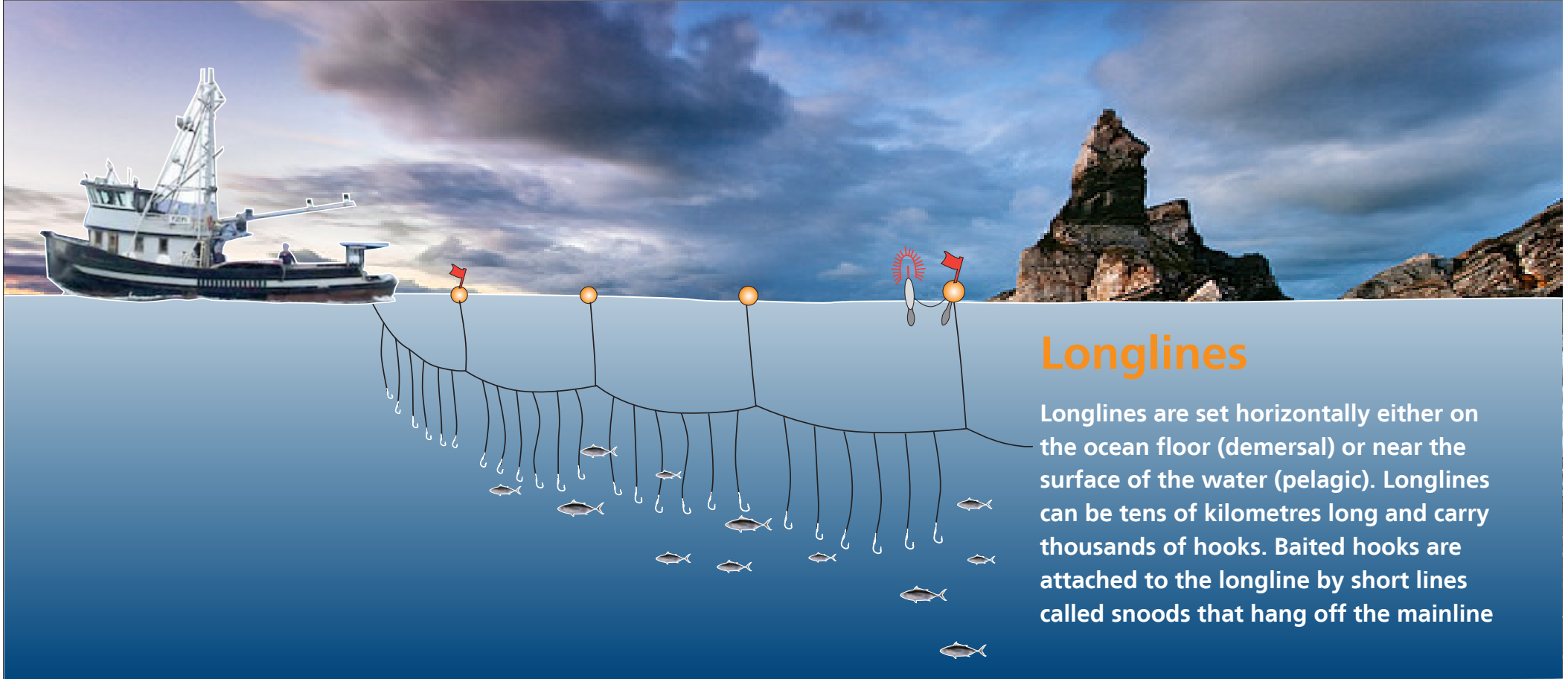
Edible parts

Fillets from the side of the fish, but also commonly sold whole



Touch screen to return





Longlines

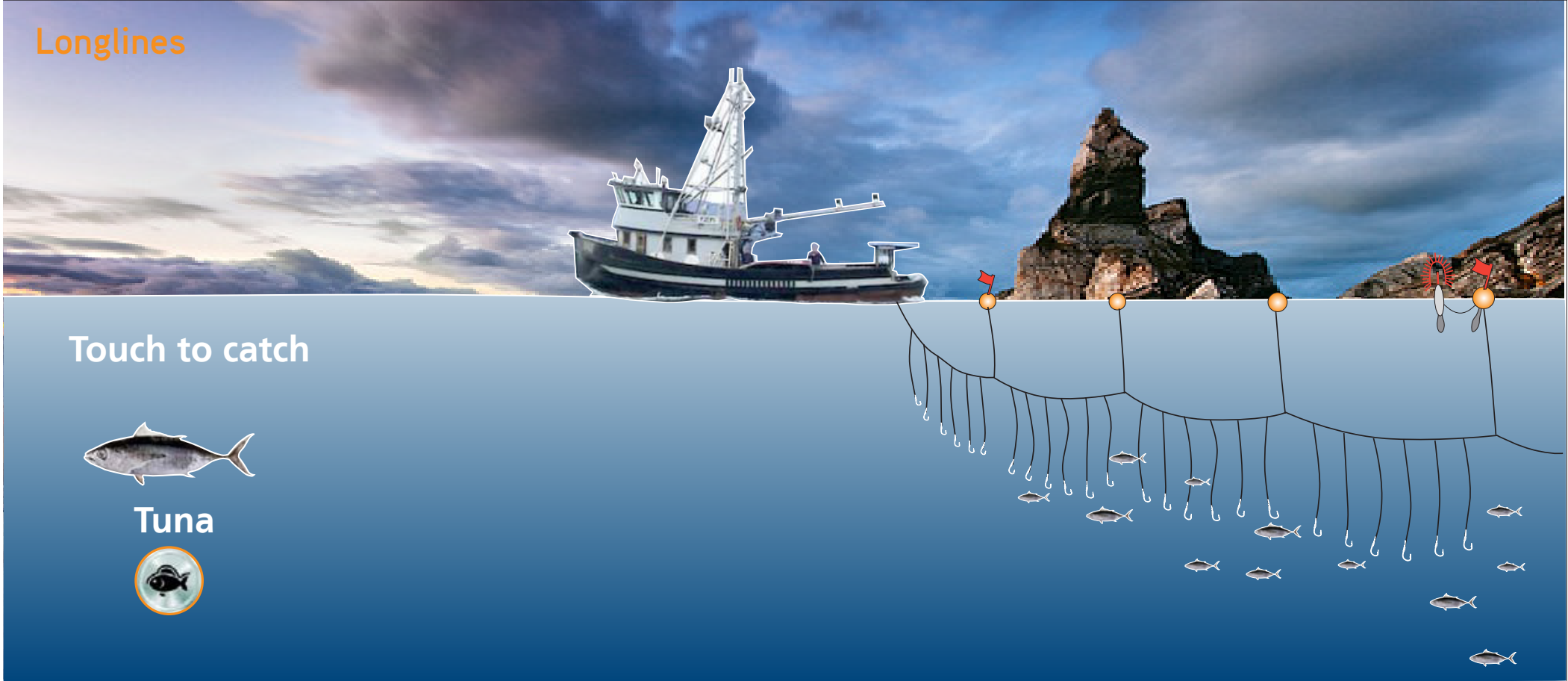
Longlines are set horizontally either on the ocean floor (demersal) or near the surface of the water (pelagic). Longlines can be tens of kilometres long and carry thousands of hooks. Baited hooks are attached to the longline by short lines called snoods that hang off the mainline



Touch screen to continue



Longlines



Touch to catch



Tuna



Touch screen to select



Tuna
Great choice!



50cm

Yellowfin Tuna

Thunnus albacares

Habitat

Saltwater

Size

50 - 190 cm

Wild / Farmed

Wild

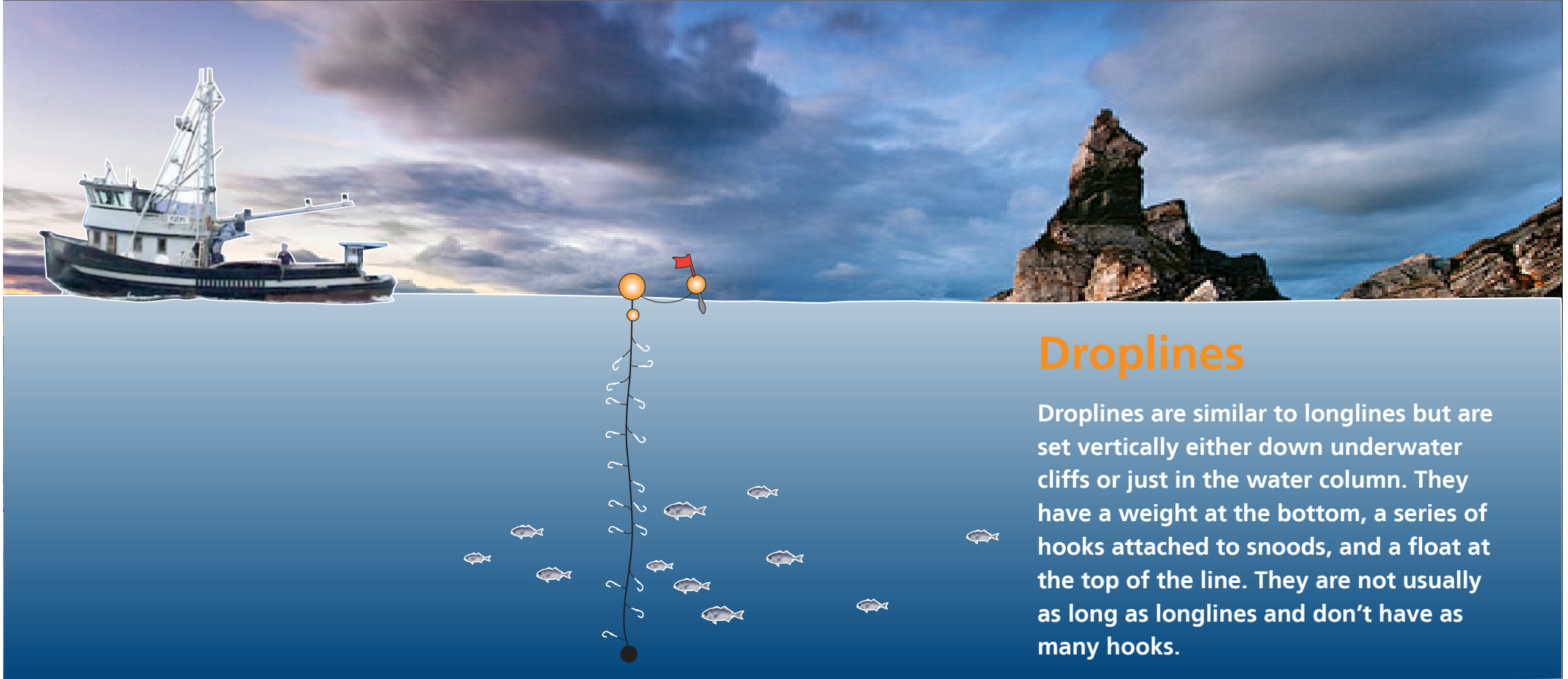
Edible parts

70-75% Fillets from whole tuna



Touch screen to return





Droplines

Droplines are similar to longlines but are set vertically either down underwater cliffs or just in the water column. They have a weight at the bottom, a series of hooks attached to snoods, and a float at the top of the line. They are not usually as long as longlines and don't have as many hooks.



Touch screen to continue



Droplines



Touch to catch



Trevalla



Snapper



Touch screen to select



Trevalla
Great choice!



50cm

Blue-eye Trevalla
Hyperoglyphe antarctica

Habitat
Saltwater

Size
to 140cm

Wild / Farmed
Wild

Edible parts
Fillets from the side of the fish, but also commonly sold whole



Touch screen to return



— Snapper —

Great choice!



380mm

Snapper

Pagrus auratus

Habitat
Saltwater

Size
30-65 cm

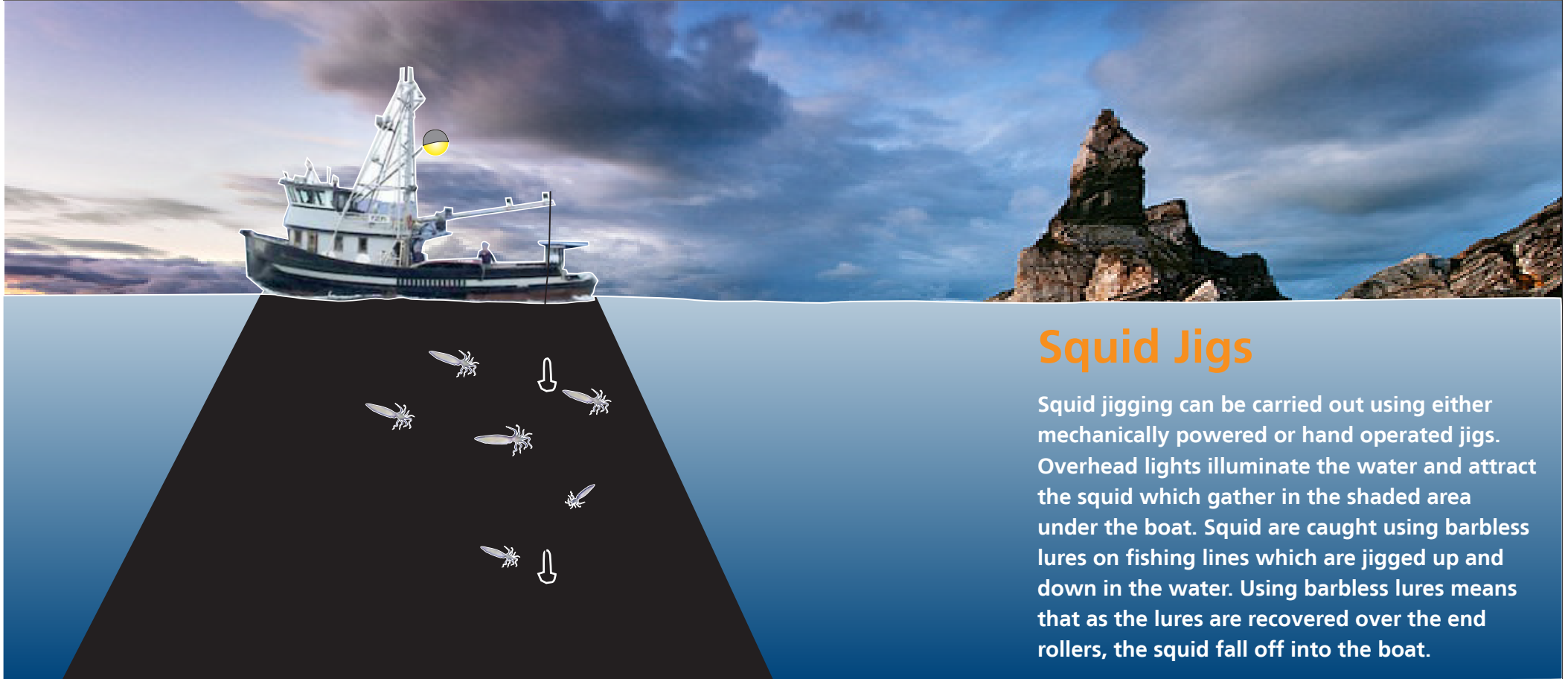
Wild / Farmed
Mainly wild, but some are farmed

Edible parts
Flesh from the body, heads and frames for use in finfish stews and stocks



Touch screen to return





Squid Jigs

Squid jigging can be carried out using either mechanically powered or hand operated jigs. Overhead lights illuminate the water and attract the squid which gather in the shaded area under the boat. Squid are caught using barbless lures on fishing lines which are jigged up and down in the water. Using barbless lures means that as the lures are recovered over the end rollers, the squid fall off into the boat.



Touch screen to continue



Squid Jigs



Touch to catch



Squid

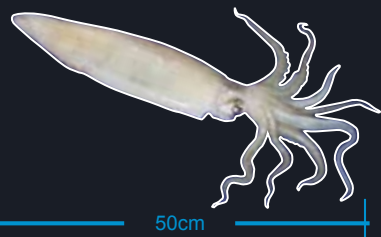


Touch screen to select



Squid

Great choice!



Squid

order *Teuthoidea*

Habitat
Saltwater

Size
- cm

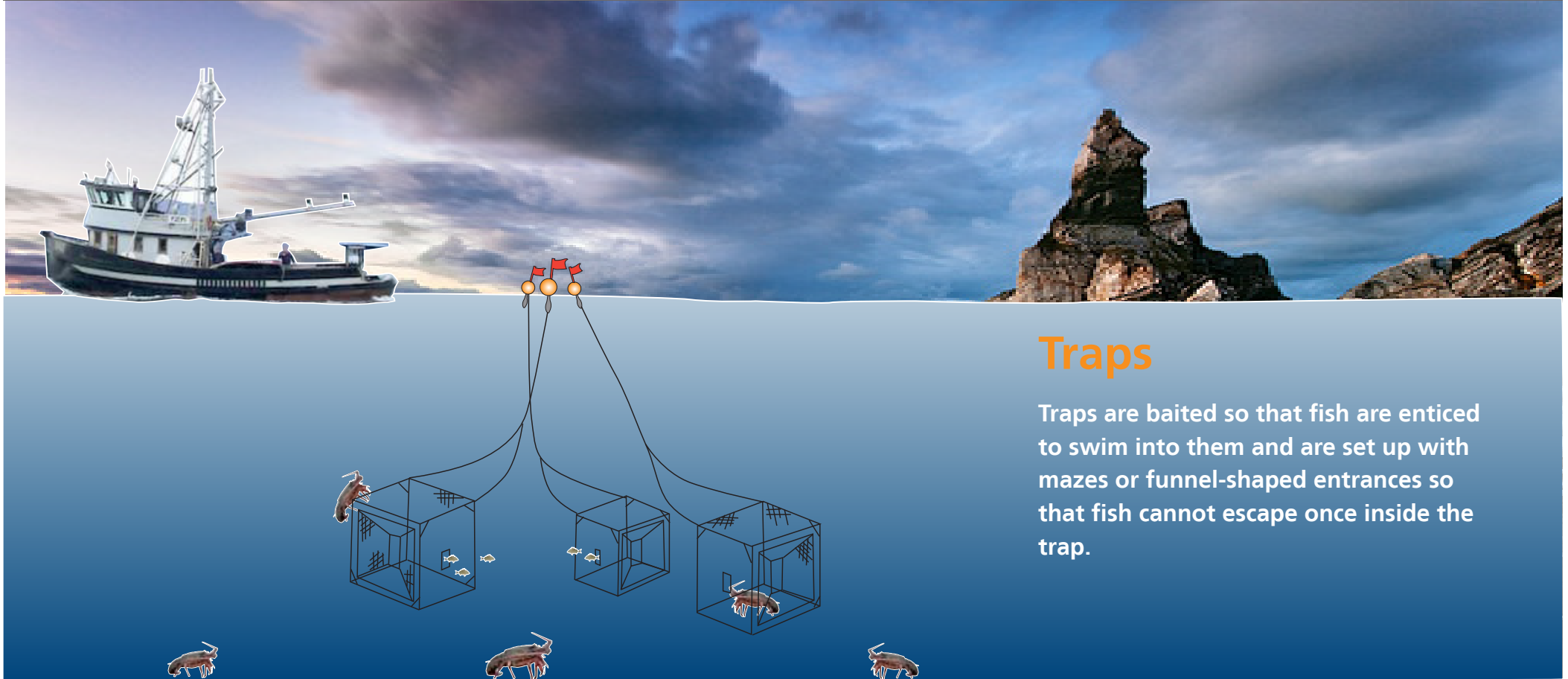
Wild / Farmed
Wild

Edible parts
Flesh from the mantle, fins, arms and tentacles, ink is used in soup and is a great colouring and flavouring for risotto and pasts. Heads of small squid can be used for dishes such as seafood marinara and in salads



Touch screen to return





Traps

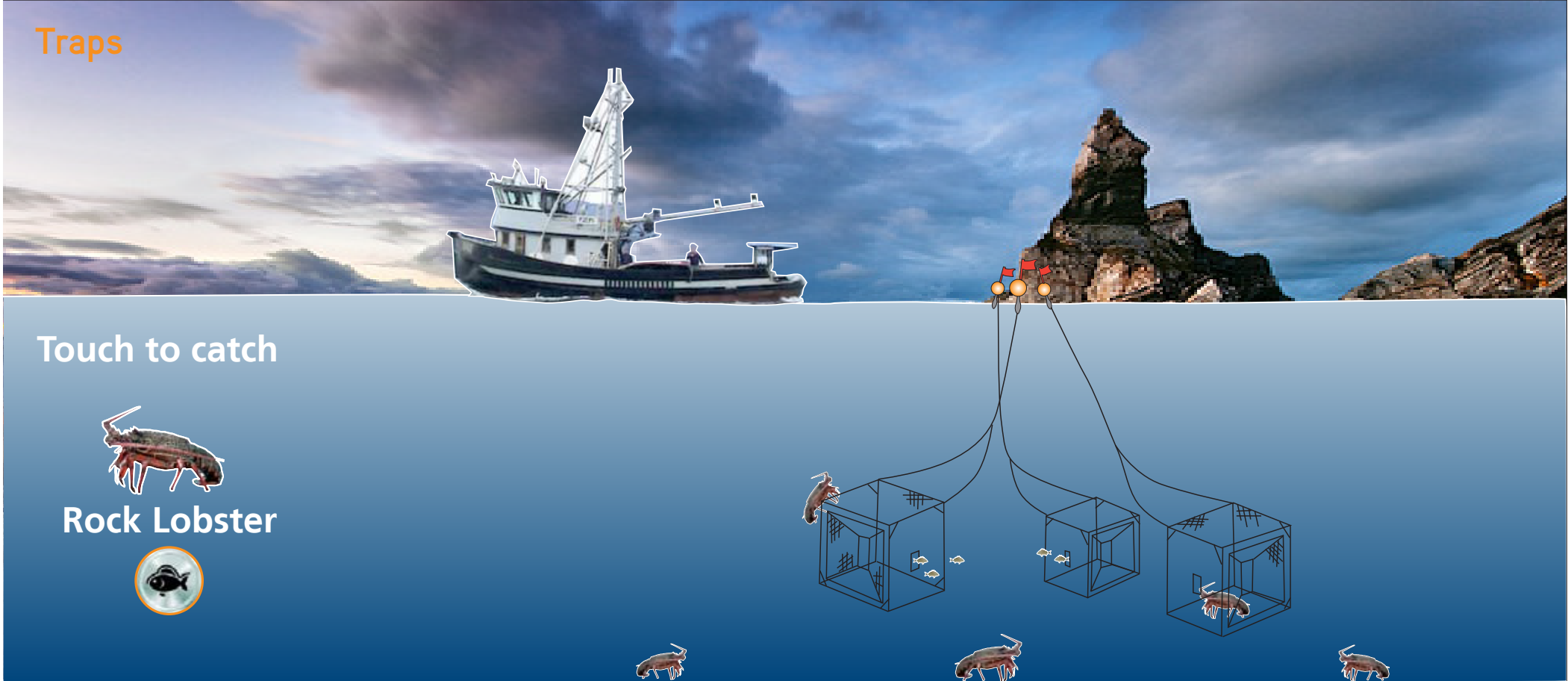
Traps are baited so that fish are enticed to swim into them and are set up with mazes or funnel-shaped entrances so that fish cannot escape once inside the trap.



Touch screen to continue



Traps



Touch to catch



Rock Lobster



Touch screen to select



Lobster

Great choice!



Rocklobster

Jasus edwardsii

Habitat

Saltwater

Size

10.5+ cm body

Wild / Farmed

Wild

Edible parts

Flesh is found mainly in the tail. The legs of large Rock Lobster also contain flesh. Carapace can be used for flavouring soups or sauces and in poaching liquids



Touch screen to return





Touch to select





Australian Fishing Zone (AFZ)

Australia's fishing industry is heavily managed.

There are penalties which include losing your fishing licence, heavy fines or even being sent to jail.



Touch to continue





Recreational Fishing

Explore the scene to learn about fishing responsibly



Touch the screen to continue





All types of fishing in Australia have laws that outline whether you need a licence, where you can fish, how much you can catch and what size you are allowed to keep. You can find out about the fishing laws from your local fisheries department.

Recreational Fishing

Explore the scene to learn about fishing re.



Touch the screen to continue





Touch the objects to explore



Main Screen



Touch the objects to explore



Don't leave your tackle behind!

Collect all hooks, sinkers, fishing line, bait bags for safe disposal at home.



Close



Main Screen





Touch the  explore

Return the little ones

Return the fish that are undersized to help maintain our fisheries.

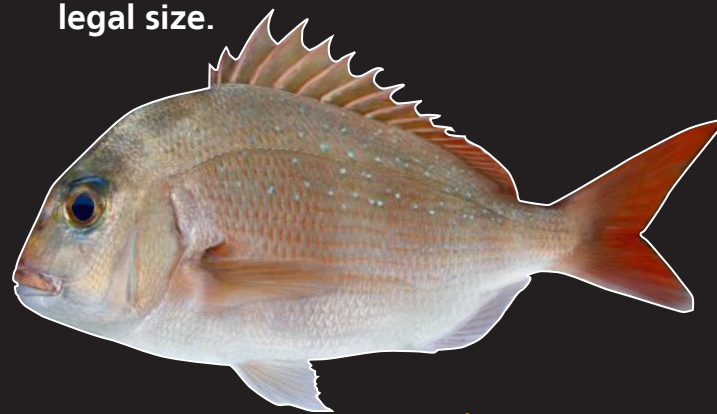




Touch the objects to

Is your fish legal size?

Use the ruler to measure the fish and determine if it is of legal size.





Touch the objects to

Your fish is legal size!



Close



Main Screen





Touch the objects to

Your fish is not legal size!

Catching and keeping undersized fish is illegal.

Your penalty could include losing your fishing equipment, heavy fines or even being sent to jail.

Close



Main Screen





Touch the objects to explore

How many fish have you caught?

You should only catch the amount of fish you need.

3



6



12



Main Screen 



Touch the objects to explore

That's too many!

Each state and territory have bag limits for different fish. It is important to know how many of one type of fish you can keep.

Close



Main Screen





Touch the objects to explore

That's fine!

Each state and territory have bag limits for different fish. It is important to know how many of one type of fish you can keep.





Touch the objects to explore

You are the solution to water pollution

Properly recycle all rubbish created while fishing.

Close



Main Screen





Touch the **Close**

Fish with friends

Never fish alone. Fish with a responsible friend known to your parent or guardian.

