

The E-boat

**Implementation of an on-board
electronic data collection and transmission system:
A working model from the South East Trawl Fishery**

**Final Report to the
Agriculture, Fisheries and Forestry – Australia
Farm Innovation Program**

June 2002

South East Trawl Fishing Industry Association

FIP Project R2N12



Department of
**AGRICULTURE
FISHERIES &
FORESTRY -
AUSTRALIA**



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**South East Trawl Fishing Industry Association
PO Box 69
Shearwater TAS 7307**

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Copies available from:
Executive Officer
South East Trawl Fishing Industry Association
PO Box 69
Shearwater TAS 7307

Phone: (03) 6428 7766
Fax: (03) 6428 7755
Email: Trawline@tassie.net.au

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NON-TECHNICAL SUMMARY

R2N12 The E-boat: Implementation of an on-board data collection and transmission system. A working model from the South East Trawl Fishery

Principal investigator: Lachlan Marshal ¹

Co-investigators: Gail Richey ¹
Ian Knuckey ²

Address: ¹ South East Trawl Fishing Industry Association
PO Box 69 Shearwater, TAS 7307

² Marine and Freshwater Resources Institute
P.O. Box 114 Queenscliff, VIC 3225

OBJECTIVES:

1. Develop and refine on-board data collection and transmission software so that it is easy to use by fishers in the SETF.
2. Liaise with AFMA to develop appropriate electronic logbook data transmission protocols and ensure successful electronic transmission of SEF1 logbook data to AFMA's AFZIS database.
3. Conduct at-sea trials of the software package to ensure its practical use on a working fishing vessel.
4. Develop an extension process that will demonstrate the advantages of the electronic logbook capabilities to the wider Australian fishing industry.

Non-Technical Summary

Initiated by the South East Trawl Fishing Industry Association, the “E-boat” project examines the full industry development potential of electronic data collection and transmission on board working South East Trawl vessels. Funded by the AAA-Farm Innovation Program as well as FRDC’s SEF Industry Development Subprogram, it is developing an integrated network of electronic tools (software and hardware) on Australian fishing vessels aimed at providing increased potential for industry development and reducing inefficiencies in fisheries data collection.

Many SETF fishing vessels have VMS, computers and a range of other electronic hardware (GPS, net monitors etc), which provide the electronic capacity necessary to revolutionise the way they collect, store and transmit information about their fishery. By integrating this hardware with the appropriate software, the full capacity of the onboard electronics can be realised. Date, time, position, depth and water temperature can be automatically recorded at the start and end of each shot. Catch composition can be entered directly by the skipper and e-mailed to fishery managers thereby meeting their logbook requirements, while other information can be kept confidential and analysed by the skipper to improve his vessel’s fishing success. Biological and environmental data can be recorded onboard, entered into the computer and e-mailed to fisheries scientists, thus providing real-time data on the fishery and improved information for stock assessments. Furthermore, the skipper can simply place the catch information on electronic marketing sites for a more efficient way of marketing and selling the fish. In the long term, SETFIA believes that a fleet of fishing "E-boats" could provide invaluable information to fishers, researchers and managers alike, whilst significantly reducing the costs to industry of managing the fishery.

Outcomes Achieved

The electronic logbook developed in conjunction with this project provides the fishing industry with a unique and intelligent database solution for the capture, analysis, reporting and management of all fishing data. Through the efforts of this project the SETF has been able to develop the software into a user-friendly package that is customised to their fishery yet applicable to the broader Australian fishing industry. As this industry enters the information technology age, the data collected in the electronic logbook will be the foundation for broader use of this information by all stakeholder groups. The true value of this information will only be realised as its application spreads and the time-series of data increases.

BACKGROUND

Australia's South East Trawl Fishery (SETF) is a complex multi-species fishery with an annual landed catch of around 30,000t, valued at over \$60 million. In addition to a developing export component, the fishery provides most of the fresh fish to markets in the southern capital cities, supporting millions of Australian seafood consumers. The commercial fishing industry in south eastern Australia employs over 2500 people and is an integral part of the regional infrastructure of coastal communities.

Throughout the year, hundreds of fishing vessels operate across the shelf and upper slope waters in south eastern Australia. These fishing vessels could provide a wealth of information on the marine environment for fishers, researchers, managers, environmental groups and other stakeholders – if only they had the appropriate tools. At the moment, however, the process of collecting and distributing this information is extremely inefficient. As part of the statutory requirements of their licences, all SEF vessels must submit a shot-by-shot catch and effort logbook to AFMA. This SEF1 logbook contains information on the vessel details, date and time of fishing, latitude and longitude, gear type, catch composition and weight of species caught. This has to be entered by hand by the skipper on a paper logbook, posted off to fisheries managers, where it is key-punched and validated. Environment Australia requires separate recording and notification of sightings and interactions with rare, protected and endangered species. Fishers record their private fishing records separately and often keep note of a variety of environmental conditions in an effort to improve their harvest of the resource. Information required to run an economically viable fishing business (fuel costs, stores, bait, running costs etc) may also be recorded. To collect biological information, scientists need to come onto fishing vessels with their own computers (at great expense to industry) collect and key-punch the information for analysis and use in stock assessment. Furthermore, in order to target catches, skippers rely on phoning shore-based connections to find out what is on the market, how much it is selling for and what and how much fish is worth bringing in. To sell the catch, the fisher must communicate to cooperatives, small business and large markets. The complexities of this system, overheads taken by the different handlers etc all help to increase the inefficiencies in marketing and selling the fish.

The South East Trawl Fishing Industry Association (SETFIA) recognised that there must be a better way for fishing vessels to collect and transmit all of this valuable information. They considered that the establishment of a suite of interactive electronic tools (software and

hardware) on Australian fishing vessels was the key to reducing inefficiencies in fisheries and providing increased potential for industry development.

At the same time that SETFIA was considering development of an electronic logbook, the Australian Fisheries Management Authority (AFMA) was undertaking a review of catch and effort logbooks to ensure that the data currently being collected meets the needs of management and researchers. The review aimed to develop a consistent approach to the collection of data across all logbooks in use in all the Commonwealth fisheries. The Federal Government's *Electronic Transactions Act 1999* required that any government agency that collected information in paper format (ie AFMA's collection of logbooks) must develop the capacity to collect that same information in an electronic form by July 2001. In line with this, it was imperative that AFMA develop the logbook data specifications to ensure logbook data submitted in an electronic form could be received and consolidated into the central logbook database. AFMA was required to specify and publish the format and mechanisms for the electronic submission before July 2001. At SETFIA's insistence, the SETF was chosen by AFMA to undertake the trials to initiate this process.

Thus, the opportunity arose for SETFIA and AFMA to coordinate their complementary projects and in May 2000, a workshop was held where various stakeholders worked with SETFIA and AFMA to develop a cost effective electronic logbook capability that met AFMA's need to collect accurate and reliable data as well as meeting industry's progression toward integrated data collection and reporting. The objectives of this workshop were to:

1. Review and determine what data must be collected in the SETF logbooks for management and research purposes, and
2. Develop a shared understanding of requirements for both paper and electronic based logbooks.

As part of the workshop, two short-listed companies (OLRAC and Terra-vision) gave presentations outlining the electronic logbook software they had developed. Based on these presentations and further discussions with the software designers, SETFIA decided that the OLRAC software would be the most suitable to begin trials with for implementation of electronic logbooks in the fishery.

As a model to other fishing vessels, this project was established to develop the most up-to-date electronic data collection and transmission software on a SETF commercial fishing vessel. The potential advantages of such an "E-boat" to meet all of the needs of the fishers, researchers and managers were explored.

OBJECTIVES

1. Develop and refine on-board data collection and transmission software so that it is easy to use by fishers in the SETF.
2. Liaise with AFMA to develop appropriate electronic logbook data transmission protocols and ensure successful electronic transmission of SEF1 logbook data to AFMA's AFZIS database.
3. Conduct at-sea trials of the software package to ensure its practical use on a working fishing vessel.
4. Develop an extension process that will demonstrate the advantages of the electronic logbook capabilities to the wider Australian fishing industry.

METHODS

Implementation of software on the vessel

To get the standalone software operating on the vessel, all of the AFMA databases on fishery, species, gear, processing types, packaging etc were transferred into the software. There was a requirement to load the software onto the onboard computer and trial data entry and summaries by the skipper. Familiarisation of the skipper and owner with the software package was an integral step in this process.

Hardware connections were established between the computer and the other vessel hardware (eg. GPS, sounder, netsonde) to enable the software to automatically collect data on date, position, time, depth, tow direction etc.

Development of data transmission protocols

Meetings with the various agencies that would require the data from the fishing vessel, (eg. Managers, scientists, vessel companies, Environment Australia, marketing and retail agencies) were undertaken to determine the form of the data that was required. Through a project run by Dr Phil Morgan and Mr Peter Witheridge, AFMA worked closely with SETFIA in developing the protocols required to receive electronic SEF1 logbook information from SETF vessels. The software was then programmed so that data was released in the correct format. Trials of the data transmission were then made.

Once the data transmission protocols were established, the potential for VMS to be used to enable direct transmission of data to land-based end-users while the vessel is still at sea was examined. The most effective and efficient form of data transfer for the SETF was explored.

At sea trials

Once the software was installed and data transmission protocols were established, the software was trialed on commercial vessels under normal fishing conditions. The skippers endeavoured to use the software and reported back on the pros and cons of operating it. Based on this feedback, any problems that were encountered were used to improve and fine-tune the system on a continual basis.

Extension

A comprehensive extension phase was built into the project. This involved extensive meetings, workshops and presentations to members of the fishing industry across Australia. Initially these were targeted at the SETF members, but later they targeted broader trawl fisheries and also non-trawl fisheries (trap/pot/hook). A user manual was produced to explain to fishers how to install and customise the electronic logbook on their boats. A web-site and on-line help system were also developed to help with extension, promotion and backup issues.

RESULTS & DISCUSSION

Software development and implementation

Expressions of interest were sought from operators in the South East Trawl Fishery (SETF) in participating in a trial of the software. Several operators indicated they would be prepared to make their skippers and vessels available. Mr Lachlan Marshall was identified as the most appropriate operator, as he had reasonable computer skills and adequate computers on both his SETF vessels, and another in his office. This would enable trials to be conducted between the two vessels, the vessels and his office, and between his vessels/office and the Australian Fisheries Management Authority (AFMA).

The software has been developed by Ocean and Land Resource Assessment Consultants (OLRAC), a firm based in Cape Town, South Africa. Dr Amos Barkai came to Australia, and spent a few days with Mr Marshall in Eden, installing the software as it existed at the time.

After the software was installed, considerable resources were devoted to modifying the software. Mr Lachlan Marshall (SETFIA), Dr Amos Barkai (OLRAC) and Dr Ian Knuckey of Marine and Freshwater Resources Institute (MAFRI) were heavily involved in the development phase of the project. There were four main aspects to these modifications as outlined below.

- ? Considerable changes were made to make the software more user-friendly for skippers. This included changing the layout of the screens, simplifying key-stroke requirements, and improving the query mapping and reporting procedures. Throughout the development phase of the project, OLRAC worked closely with skippers and scientists involved in the SETF to continually update and improve the software.
- ? OLRAC undertook to install an XML reporting tool into the software to meet AFMA's requirements for electronic reporting of the SEF1 logbooks. This was an extensive addition to the software and took a considerable amount of time. We appreciated that OLRAC provided most of these changes (which are only a requirement in Australia) at their own time and expense.
- ? The software had to be customised for use in the SETF. This required incorporation of a complete list of species caught in the SETF (>200 species) including their common names, scientific names and CAAB codes. Furthermore, details of ports, vessels, processing methods etc had to be installed in the software.
- ? While undertaking all of the above, various bugs in the program were detected and fixed. Open communication between the end-users and software developers enabled this aspect of the modification to be undertaken in a quick and efficient manner.

On-board Connectivity

The software was installed on the two trial vessels. The software uses the PC's calendar and clock to input current date and time information into the software. The primary hardware connection for data input into the software is the onboard Global Positioning System (GPS). Using the standard data-ports, the GPS latitude and longitude data can be transferred to the PC for use in the software. The standard communication links of COM port, Baud rate, data bits, parity and Stop bits can be altered to match the particular GPS system. Although there was no trouble linking with the GPS, the software has a useful system to capture the output from the GPS and send this information to a file which can be sent to OLRAC so they can

provide technical support if difficulties do occur. The other hardware connections that are required for the day to day running of the software are a floppy disk drive for data transfer between vessel and office (if required) and a CD drive for program installation and updates.

Data Transmission Protocols

There has been extensive liaison between AFMA, SETFIA and the software developer (OLRAC) to develop the data transmission protocols. These protocols were tested extensively and successful data transfers have taken place. AFMA has developed an electronic data reception facility to their AFZIS database. This requires that logbook data sent to AFMA are coded in XML (eXtended Markup Language). As part of the confidentiality and verification system, this XML must be emailed to AFMA after being encrypted. Any person sending these emails to AFMA must be issued with a digital security certificate that only they can use.

Details of the data transmission protocols developed by AFMA in conjunction with the work undertaken during this project by SETFIA and OLRAC are detailed in the Technical Overview provided in Appendix 1.

Real-time transmission of data

The transmission of logbook data from the office software to AFMA now works well. Initially, there were a number of inconsistencies in the format of the various data fields of the attached xml file and the format of the body of text in the e-mails. Through communications with AFMA, these problems were sorted out and the xml code is now written automatically by the software to suit all of the current AFMA requirements. In this way, the fisher can not alter the correct fields and formats of the xml sent to AFMA. One potential difficulty in this system is that if AFMA changes the field requirements in the future, associated changes in the hardcode of the software will need to be changed. Numerous tests of the transmission of trip data, non-fishing days, and vessel data have been successful.

AFMA also has a very specific body of the e-mail that is required:

AFMA-transaction-version: 1.0
AFMA-format: XTRAWL01
BoatId: Phantom
Client-reference: Phantom2
Filename: xtrawl_trip_2.xml

Where: BoatID is the Specific vessel registration; Client-reference is the fisher's code for that particular transmission; and filename is the name of the attached xml file.

This information needs to be copied exactly into the body of each e-mail that is sent to AFMA. The only changes that need to be made by the fisher are to the client reference and the filename. If this process is done correctly, there are no problems with the transmission of data. In practice, however, there were a number of requirements that had critical implications for the ease of which skippers could undertake this task. In order to provide electronic logbooks that comply with the *Electronic Transactions Act*, transmissions must have valid record keeping, security and authentication procedures. To this end the fishers are required to acquire an Australian Business Number associated Digital Signature Certificate from an approved Certificate Authority (ABN-DSC) and send their e-mails with transmissions through the email in an encrypted format. This is relatively new technology, which requires the skippers/owners to have a reasonable level of computer literacy. For example, they must know how to download files from the software and where those files will be stored. They then need to open a new e-mail to the AFMA electronic logbook section, insert the correct body text, attach the downloaded xml file and send it off with their digital signature and encryption. Whilst this is not particularly difficult for people that work with computers and files regularly, it has taken some time for skippers/owners to become accustomed to this procedure. This difficulty is not, therefore, a direct problem with the development of the software, but more of an issue related to the requirements of data transmission to AFMA to meet legislative requirements. Nevertheless, unless this process could be made relatively simple, it had the potential to cause problems with the implementation of electronic logbooks on the vessels. To overcome this, it was decided to commission OLRAC, as part of the E-boat project, to develop a separate module in the software to carry out this task. This included construction of a new transmission email, automatic entry of appropriate body text, attachment of appropriate xml file and transmission with encryption and digital signature. Completion of the development of this module made it easy for skippers to undertake the whole process with minimal computer skills.

At sea trials

Even skippers with minimal computing experience have been able to easily operate the software. Correct customisation of the software has been an important step in this process. For example, the software was changed to be key-sensitive when names of fish species are typed in. For example, when typing in “sh” the software will automatically go to sharks. One difficulty with the original species names was that skippers would need to know the correct name of the species in order for the software to “guess” what the skipper was typing in ie you would need to type in “tig” in order to get to tiger flathead. By customising the names to

“Flathead, tiger” or Flathead, sand” it allows the skipper to get to flathead first and then choose what species. This has been very useful in speeding up data input by the skippers.

Installation of the software and its connection to the GPS has worked in conjunction with the C-plot software commonly used on many SEF vessels without minimal technological problems. Although the standard Windows operating system allows for quick tabbing (Alt-Tab) between different software, different screen resolutions used by these two software packages meant that each time the software was chosen the screen resolution had to be changed. It became apparent that this would be annoying, but a number of solutions were available. First, there was a new version of C-plot available that used the more up-to-date resolution of 1024 x 768. Although this was an easy solution, the skipper/owner decided they would like to keep C-plot open continually – so they opted to install a second video screen connected to the same PC through a supplementary video card (Figure 1). This was a successful solution in this case, but it did cause a number of technical problems initially (lack of memory and a few hardware problems) that were overcome. Other skippers now have the choice about whether to install dual monitors. Many may already have a version of C-plot that runs with a 1024 x 768 resolution, but still may like to install dual monitors. The reasoning that skippers may prefer this option is because the main time for data entry is during the tow of the next shot. Skippers indicated that they were very reluctant to not have C-plot continually visible during this time.



Figure 1. OLRAC software (upper) running in conjunction with C-plot on dual monitors installed on the Huon Petrel during E-boat trials.

Extension

There was extensive demonstration and promotion of the software throughout the term of this project. This has resulted in considerable interest in the software from a number of fisheries across Australia. Orders for the software are now beginning to be placed with OLRAC. The encouraging sign was that these orders were coming from fisheries other than the South East Trawl, to which most of this project was targeted. This was mainly because an explicit part of the extension phase of the project during milestone four was to demonstrate the E-boat project and the underlying software to a number of fisheries other than the South East Trawl. Following these specific promotional activities, other fisheries interested in the trawl software include the Northern Prawn Fishery and the East Coast Trawl fishery. Demonstration of the non-trawl version of the software (longline and pot/trap) has garnered interest from fisheries as diverse as the East Coast Tuna longline fishery, the South Australian rocklobster fishery and the abalone fishery. There is no doubt that further development work will be required to customise the software versions for these fisheries to meet their specific fishery management requirements. Nevertheless, interest in the software has been raised to a point where OLRAC is receiving requests from people to be agents for the software for the different fisheries in Australia. It is interesting to note that a significant portion of the development work carried out as a part of this project has led to overall improvements in the applicability of the software to fisheries in other parts of the world. Most notably, a number of New Zealand trawl fishery companies have purchased and are currently using the software.

The E-boat project and the software were presented at numerous industry meetings and workshops. Specifically, these include presentations for the South East Trawl Fishing Industry Association, East Coast Tuna Boat Owners Association, Northern Prawn Fishery, Rocklobster fishery and South Australian Abalone fishery. Examples of the promotional material that accompanied these industry meetings are included in Appendix 2. As a result of these presentations and various other promotional events throughout the term of the project, well over 1000 industry members have been exposed to the E-boat project and the OLRAC software. A full list of the extension and promotion activities undertaken as part of this project and the articles that were published are provided in Appendix 3.

As a result of the extensive promotion of the electronic capabilities of E-boat, the project is being heralded as one of the more innovative R&D projects in recent years, and one that is likely to make a significant change to the way fisheries information is collected, transmitted and analysed during the next decade. As an indication of this, a project is currently being

developed that uses the E-boat software as the foundation for vessel-based collection of environmental data to help fisheries managers and researchers interpret and model catch rates as a long-term index of abundance for species throughout south eastern Australia. As such, E-boat is set to be an integral part of fisheries management of the SETF for many decades to come.

An extensive user manual has been incorporated as part of the software package. Throughout the course of the E-boat project, this was developed and modified by OLRAC to provide a user-friendly interface to get help on any aspect of the project (Appendix 4). In addition to this, a specific South East Trawl user manual has been prepared in order to help SETF fishers install and customise the software specifically for their fishery. Many of these customisations are necessary in order for the data to match the field codes prescribed by AFMA. Such codes include: CAAB species codes; port codes; gear codes; fish production codes etc. An example of the codes that are included in the user manual are given in Appendix 4.

Given the use of the software as a means of electronically submitting logbook returns, it was considered that in the long-term, most users would become increasingly computer literate. In this respect, the most efficient means of providing users with an up-to-date manual was to develop an electronic version of the user manual on the new SETFIA website. Development of the web pages relating to the E-boat project is currently underway. The website version of the manual is expected to be completed by late July.

Appendix 1 – Technical overview

Electronic Logbook Return – Trawl version 1.0 (Trial)
SETF Trial Project
Technical Overview

Introduction

The purpose of this overview is to introduce the processes and technology proposed for electronic logbook returns generally, and the processes and technology for the electronic logbook trial in the South East Trawl Fishery in particular.

AFMA Electronic Logbook Returns will be the approved method for electronic submission of logbook returns in compliance with the Commonwealth *Electronic Transactions Act 1999*. To ensure compliance with the Act, AFMA will develop Electronic Logbook Return specifications which will define:

- ? return format,
- ? authentication and privacy method,
- ? record keeping, and
- ? information technology requirements.

For the trial, the Electronic Logbook Return cannot replace completion of SEF1Bs for statutory reporting.

Processes

When the specifications are implemented, there will be two phases to enabling fishers to submit Electronic Logbook Returns, .set up, then operation.

The set up processes proposed to enable fishers to provide statutory reports electronically are:

- 1) A software/system approval process for systems used to submit Electronic Logbook Returns. The purpose of the approval process is not yet defined, but is intended to ensure:
 - a) reports are submitted in the required format,
 - b) data is maintained that shows when records of operations were recorded - in line with statutory requirements, and
 - c) record keeping and authentication comply with the *Electronic Transactions Act*.
- 2) An application/approval process for fishers to use an approved system for statutory reporting. Steps to approval would be:
 - a) the fisher would acquire an approved system;
 - b) the fisher would acquire an Australian Business Number associated Digital Signature Certificate from an approved Certificate Authority (ABN-DSC - part of the Australian Government's electronic commerce initiative) for authentic and secure messaging across the Internet. The certificate will include:
 - i) identifying information of the individual and their business
 - ii) electronic mail address;

- c) the fisher would provide relevant details of these to AFMA; and
- d) AFMA would issue the fisher with Boat Ids for use with approved systems for nominated boats.

There will not be any approval processes in setting up for the trial. The conduct of the trial will be as agreed between AFMA, SETFIA, SETFIA's software supplier and SETFIA's nominated fisher.

- 1) AFMA will provide:
 - a) a data dictionary corresponding to the agreed logbook data elements;
 - b) a transaction specification for the electronic mail messages to be used in the trial;
 - c) a format specification for trial logbook returns in the form of an eXtensible Markup Language (XML) Document Type Definition (DTD) ;
 - d) example messages;
 - e) AFMA-generated digital signature certificate(s) for the trialists to use in the trial for privacy and to test message authentication (ABN-DSCs are not yet available to use for this purpose);
 - f) AFMA digital certificate to use for encrypting trial messages to AFMA; and
 - g) Boat Ids to use in the trial.
- 2) AFMA will need the fisher to nominate an electronic mail address they will use for the trial for inclusion in their AFMA-generated digital certificate. This may be one for the company (if all messages will be sent from head office), or one for each boat (if each boat will submit returns individually).

The rest of this overview describes the Electronic Logbook Return transaction and summarised Electronic Logbook Return document structure proposed for the trial.

Transaction

An AFMA Electronic Logbook Return transaction will comply with the requirements of the Australian Commonwealth *Electronic Transactions Act 1999*. The transaction will be conducted using electronic mail, and will consist of:

- 1) a message from the AFMA client or their authorised representative containing the formatted logbook return and reference information; and
- 2) an acknowledgment message from AFMA containing reference information.

Technical description of the transaction:

- 1) digitally signed and encrypted message from the AFMA client or authorised representative to the AFMA transaction processor mailbox containing:
 - a) "Subject:" field can be blank or have any content
 - b) "To:" "elog.trawl.trial@tp.afma.gov.au" (specific to the trial)
 - c) "From:" and/or "Reply to:" field has the fisher's nominated electronic mail address for the trial (optional – AFMA will use the address in the fisher's digital certificate);
 - d) SMIME encrypted "Message text" will contain identifying information consisting of the following lines of text:
 - i) "AFMA-transaction-version: 1.0" (specific to the trial)

- ii) "AFMA-format: XTRAWL01" (specific to the trial)
 - iii) "BoatId: " *AFMA issued Boat Id*
 - iv) "Client-reference: " *client's unique transaction identifier* (up to 10 alpha-numeric characters, no white space)
 - v) "Filename: " *name of the attached XML file containing the formatted logbook return.*
 - vi) a blank line
- e) SMIME encrypted XML file attachment containing the formatted logbook return.
- 2) digitally signed and encrypted acknowledgment message from the AFMA transaction processor to the AFMA client electronic mail address, for the Boat Id, containing:
- a) "Subject:" blank
 - b) "To:" *electronic mail address from the digital certificate in the message being acknowledged*
 - c) "From:" and/or "Reply to:" "elog.trawl.trial@tp.afma.gov.au" (specific to the trial)
 - d) SMIME encrypted "Message text" will contain identifying information consisting of the following lines of text:
 - i) "AFMA-transaction-version: 1.0" (specific to the trial)
 - ii) "AFMA-format: XTRAWL01" (specific to the trial)
 - iii) "BoatId: " *AFMA issued Boat Id*
 - iv) "Client-reference: " *client's unique transaction identifier*
 - v) "AFMA-reference: " *AFMA's unique transaction identifier* (up to 10 alpha-numeric characters, no white space)
 - vi) "Status: " "Accepted" *or* "Rejected"
 - vii) if rejected, one blank line followed by reason(s) for rejection

Transaction notes:

- 1) The transaction will be considered to have occurred when an "Accepted" acknowledgment is sent from AFMA.
- 2) The AFMA transaction processor electronic mail address for submitting Electronic Logbook Returns for the South East Trawl fishery trial will be "elog.trawl.trial@tp.afma.gov.au".
- 3) The Boat Id will be allocated by AFMA as a key identifier for Electronic Logbook Returns. For the SET trial it will be issued to the participant(s) for vessel(s) used in the trial.
- 4) It is the responsibility of the client and AFMA to each retain a copy of the logbook return as submitted.
- 5) If AFMA is unable to process an incoming message, no response message will be sent. (AFMA expects to be ready to use digital certificates for authenticity and privacy in the trial. Unprocessed messages will be saved for problem resolution.)
- 6) Technical:

- a) Message format is intended to allow for it to be fully implemented in common email client software, including digital signature and encryption, or by the reporting software using a mail API.
- b) Message text formatting must conform to MIME format:
 - i) Content-Type: text/plain; charset=us-ascii
 - ii) Content-Transfer-Encoding: 7bit
- c) White space mean <space> <carriage return> <line feed> <tab> or any other non-printing character or characters.

Document Structure

The South East Trawl Fishery electronic logbook return document structure is designed to allow returns with similar content to existing paper format gear sheets and to fishing operation reports (daily fishing logs) or both. The document structure for other fishing methods or fisheries may differ from that shown here.

AFMA will publish an XML Document Type Definition (DTD) for each type of electronic logbook return.

Notation:

? hierarchy structure

* 0 or more occurrences

+ 1 or more occurrences

otherwise the entity or sub-entity occurs once

This document structure and corresponding XML-DTD will allow for a comprehensive report that includes all data, or for the following anticipated types of reports:

? Boat and Gear

? Non-fishing (in port, waiting on weather, under repair/refit, etc.)

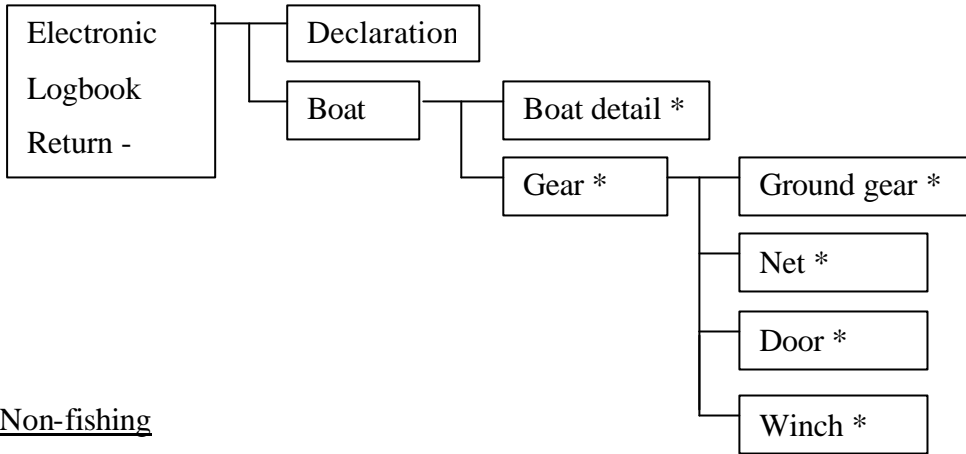
? Trip (one or more whole trips)

? part Trip (one or more Operations and/or non-fishing day's Trip details)

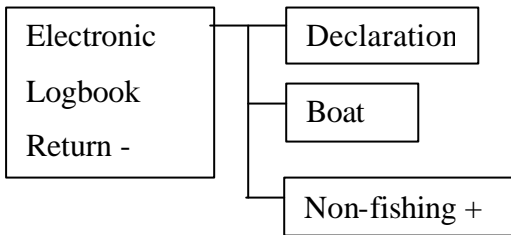
? Wildlife interaction.

The parts of the document structure used in each of these types of reports are shown below for clarity. The intent is to allow timeliness of reporting to meet statutory requirements regardless of trip durations.

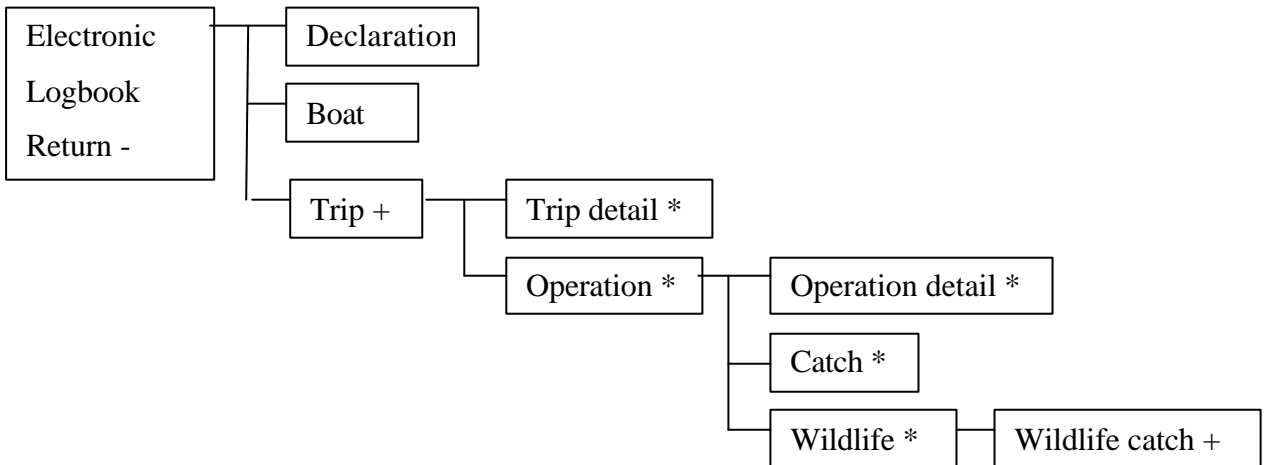
Boat and Gear



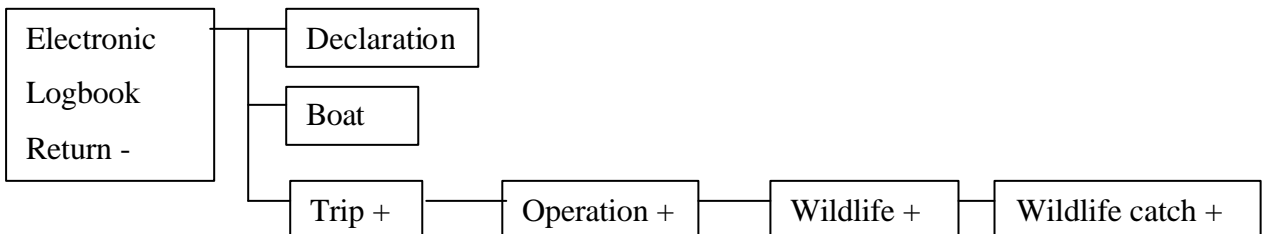
Non-fishing



Trip



Wildlife



Appendix 2 - Extension and promotion



*Invitation to Industry Innovators
Free Industry Presentation*

Commercial Electronic Fishery Management System E-Boat

Port Lincoln - Thursday 23 May 2002

Morning 9:30am – 11:30am

or

Afternoon 1:30pm – 3:30pm

Presented by Ralph Mitchell

Spencer TAFE

Adelaide - Thursday 6 June 2002

1:00pm – 3.00pm Presented by Dr Amos Barkai and Dr Mike Bergh

3.30pm – VMS PIRSA

Fishing Industry House, Lecture Theatre
Port Adelaide

Overview

A demonstration of a unique wheelhouse electronic solution for the collection, management, presentation and utilization of commercial fishing data.

The presenters have developed an electronic, fishery data management system, named OLFISH. OLFISH is a software program for capturing, storing and summarising fishing data. It can be used by skippers, managers and scientists during fishing operations and for scientific surveys. It provides a comprehensive, user-friendly means of compiling data reports. One of the most important features of OLFISH is that it virtually eliminates the need for paper logbooks. It also

The Hon Warren Truss, the Minister for Agriculture, Fisheries and Forestry, launched the project in Canberra on 25 September 2001. Approximately fifty people attended the launch, including industry, senior government officers, environmentalists, etc. In conjunction with the launch, a media release was issued jointly by AFMA and SETFIA. An article appeared in “The Australian” on 23 October 2001.

The project featured on the front page of the inaugural SETFIA Newsletter that was distributed at the end of September 2001.

SOUTH-EAST Trawl Fishery news

Responsible Fishing practices protect our future in fishing

ISSUED BY THE SOUTH EAST TRAWL FISHING INDUSTRY ASSOCIATION LTD SEPTEMBER 2001

E-Boat Project

SETFIA is committed to pursuing innovative ways to improve the efficiency of vessel operators and to reduce management costs without compromising management arrangements. As part of this commitment, SETFIA is involved in the development of electronic logbook software for use in the fishery. As the industry pays the full cost of management and compliance, this is being pursued by the industry as a cost effective and efficient way of producing better data at a lower cost.

Funds have been received from the Federal Government's Farm Innovation Program (FIP) and FRDC for the project, the aim of which in the first instance is to equip two fishing vessels in the SETF with the latest electronic data collection and transmission capabilities. This will allow the vessels to transmit electronically, information on catch and effort to government management agencies, and catches to marketing bodies, to collect biological and environmental information for research organisations and environmental agencies, and to provide capacity for fishing operators to collect commercial data for their own individual businesses.

The software developed by OLRAC in South Africa has had to be adapted to suit conditions in the SETF and to comply with reporting requirements of AFMA. Ian Knuckey has greatly assisted in this work. The two vessels participating in the project are the "Huon Petrel" and "Josephine Jean", operated by Locky Marshall out of Eden. SETFIA appreciates the dedication shown to this project by Ian and Locky, which has at times proved quite frustrating, as is the case with the development of all new software.

Common name	Product	Grade	Bin code	Storage method	# of bins	Fg product
Blue grenadier	HG	Ungraded	Grey fish boxes	iced	14	400
Mixed fish	W	Ungraded	Grey fish boxes	iced	3	100
pink ling	GG	Ungraded	Grey fish boxes	iced	5	150
sawwhelt	HG	Ungraded	Grey fish boxes	iced	0	20
iger flathead	W	M	Grey fish boxes	iced	4	120
iger flathead	W	XL	Grey fish boxes	iced	0	6
iger flathead	W	L	Grey fish boxes	iced	2	3

A sample window from the OLFISH SETF logbook

Currently all SETF operators complete daily logbooks which are posted to AFMA. The range of information collected is restricted to what will fit on a single page of a paper logbook. The new technology will allow for the inclusion of additional information including depth fished, moon phase, tides, wind, water temperature, etc. As information on species taken as by-product and by-catch will be able to be recorded, the new technology will in time reduce the need for the onboard scientific monitoring program which has been in place in the fishery since 1994, to that of validation rather than the collection of data.

The software has been adapted to suit all Australian conditions, and will be easily transferable to operators in other fisheries.

Although the uptake of the technology will be on a voluntary basis, SETFIA is confident that industry members will recognise the huge benefits to be gained by its installation. Direct savings will accrue to operators adopting the technology through reduced costs of logbook processing, and to the industry in general through reduced costs of biological monitoring (ISMP).

The project is to be officially launched by the Hon Warren Truss MP, Minister for Agriculture, Fisheries & Forestry on 25 September 2001

An over-view of the software was presented at Seafood Directions 2001, the Australian Seafood Industry National Conference. The presentation was very well received. As a result of the presentation, WIN Regional TV filmed a segment on the project which went to air in Queensland as part of a weekly segment devoted to scientific innovations.

Articles on the E-boat project appeared in “AFMA News” in October 2001 and the “FRDC News”.



Fisheries News CONTINUED...

SETFIA LAUNCHES E-BOAT TECHNOLOGY TRIAL

Collecting and transmitting data on catches and fisheries is about to go ‘high tech’ following the launch of the South East Trawl Fishing Industry Association’s (SETFIA’s) trial of the E-boat system.

The new electronic data collection and transmission system will make recording catches far more user-friendly and efficient for the industry and the Australian Fisheries Management Authority.

Launching the trial at AFMA’s Canberra offices on Tuesday 25 September, the Minister for Agriculture, Fisheries and Forestry, the Hon Warren Truss MP, said that the E-boat project demonstrated the way the fishing industry is meeting the challenges of fisheries management.

The SETFIA project received \$73,000 in matching funds through the Federal Government’s Farm Innovation Program and \$20,000 from the Fisheries Research

Development Corporation.

Mr Truss highlighted that, of the 265 applications forwarded for the Farm Innovation Program, 65 have been successful so far, with the SETFIA trial being the first grant of its kind for the fishing industry.

“This proposal for the trial was assessed by an independent committee which found the technology to be highly innovative and a step forward for the fishing industry,” Mr Truss said.

“This is good for the environment, good for the fishing industry and good for fisheries management,” he said.

SETFIA President Mr Terry Moran said that during the trial, fishers will be able to key in data about the types and quantities of fish caught, as well as environmental and biological data relevant to that particular fishery.

“This information will be transferred into on-board

computers and then sent directly from the vessels at sea to AFMA. Alternatively, operators can transfer data to a floppy disk and then forward it to AFMA through their home computers. They can also forward it directly to marketers for on-line selling of the product,” Mr Moran said.

“This device will allow fishers to capture ‘real time’ data at sea and is expected to provide a cost effective means of transmitting that data to AFMA. The adoption of the technology could see much of the current logbook paperwork replaced,” he said.

The new system is currently being tested on two commercial fishing vessels operating in the South East Trawl Fishery which have been fitted with the latest electronic data collection and transmission capabilities. ■



Mr Frank Meere, AFMA, the Hon Warren Truss MP and SETFIA President, Mr Terry Moran, at the SETFIA launch. Photo courtesy of FRDC.





Fisheries News CONTINUED...

SETFIA LAUNCHES E-BOAT TECHNOLOGY TRIAL

AFMA Managing Director Mr Frank Meere congratulated the South East Trawl Fishing Industry Association (SETFIA) for developing the E-boat technology and said that AFMA was looking forward to working with the trial boats to assess the effectiveness of the new system.

"We believe this technology will provide AFMA with more accurate and more timely information about fisheries management," Mr Meere said.

"In support of the trial, AFMA has committed funds to develop the infrastructure to receive and process catch data from vessel operators," he said.

Eden commercial fisher Lachlan Marshall has provided two of his vessels, the *Huon Petrel* and the

Josephine Jean, for the E-boat trial and is keen to see the results.

"This will be a huge step forward for fishers," Mr Marshall said.

"As we generate this detailed information it can only help us further with our fishing," he added. "I know of 14 operators within SETFIA who have agreed to buy this

equipment when the trials have been completed.

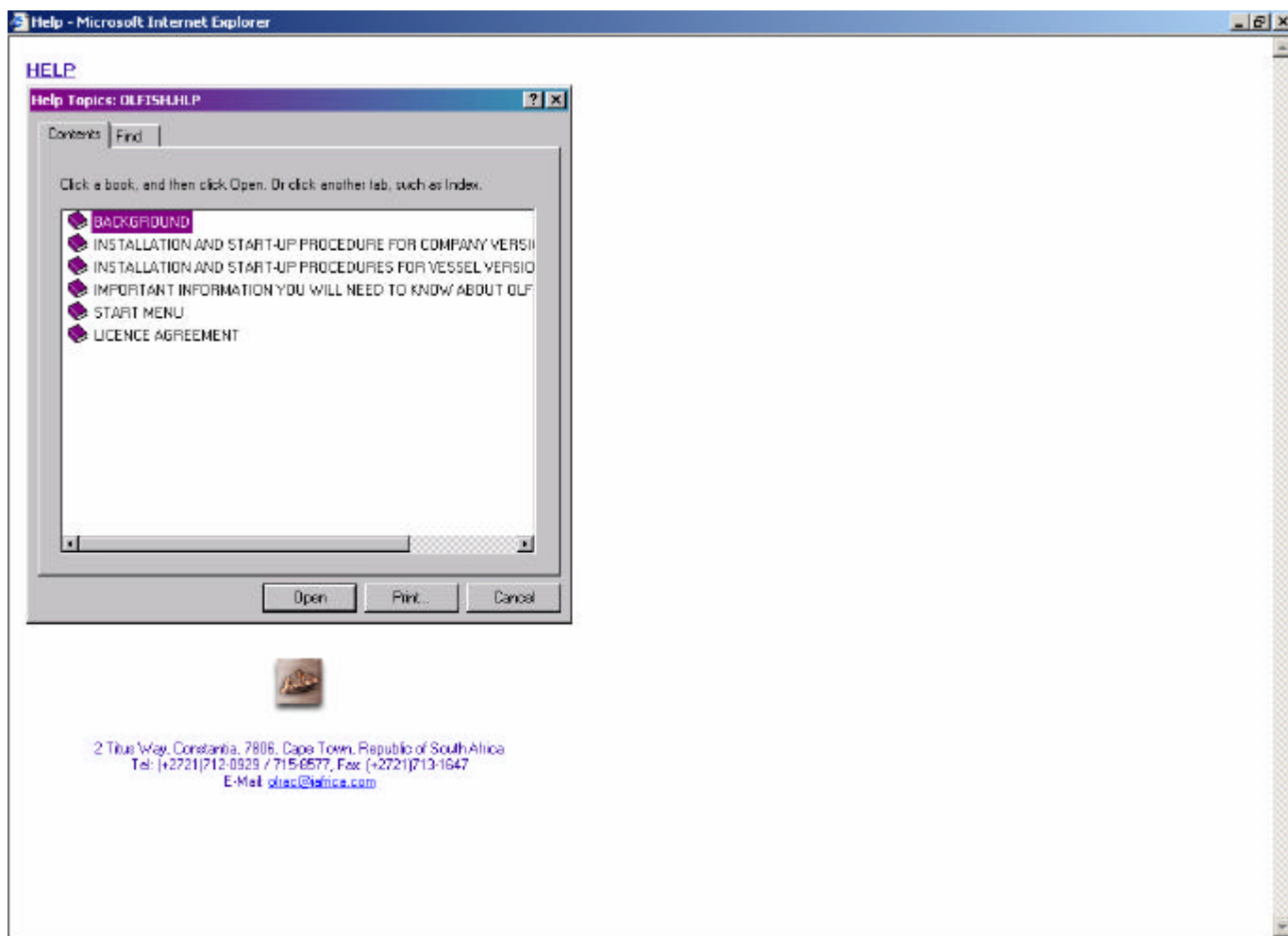
"Therefore, potentially, we will have at least 14 vessels out there operating as research vessels as well.

This is showing that we are responsible towards the fisheries because we have to manage the fisheries for our long-term future and we're doing it by example," he said. ■



Mr Frank Meere, AFMA, Mr Lachlan Marshall, the Hon Mr Warren Truss MP, Mrs Gail Riebey, SETFIA, and Mr Terry Moran, SETFIA, at the launch. Photo courtesy of FRDC

Appendix 3 – On-line help



Appendix 4 – Database codes

Port codes

New South Wales

Code	Port	Code	Port
1010	BALLINA	1260	PALM BEACH
1020	BATEMANS BAY	1270	PORT JACKSON
1030	BERMAGUI	1270	PT JACKSON
1040	BOTANY BAY	1280	PORT KEMBLA
1050	BROOKLYN	1280	PT KEMBLA
1060	BRUNSWICK HEADS	1290	PORT MACQUARIE
1070	BYRON BAY	1290	PT MACQUARIE
1080	COFFS HARBOUR	1300	PORT STEPHENS
1090	CROWDY BAY	1300	PT STEPHENS
1100	CURRARONG	1310	SANDON
1110	EVANS HEAD	1320	SEAL ROCKS
1120	GERRINGONG	1330	SHELLHARBOUR
1130	GREENWELL POINT	1340	STUARTS POINT
1140	ILUKA	1350	SUSSEX INLET
1150	JERSEYVILLE	1360	TERRIGAL
1160	JERVIS BAY	1370	THE ENTRANCE
1170	KIAMA	1380	TUNCURRY
1180	LAURIETON	1390	TWEED HEADS
1190	LORD HOWE ISLAND	1400	EDEN
1200	MERIMBULA	1400	TWOFOLD BAY
1210	MORUYA	1410	ULLADULLA
1220	NAMBUCCA HEADS	1420	WOLLONGONG
1230	NAROOMA	1430	WOOLGOOLGA
1240	NEWCASTLE	1440	WOOLI
1250	NOWRA		

Queensland

Code	Port	Code	Port
3010	BOWEN	3140	MARYBOROUGH
3020	BRISBANE	3150	MOOLOOLABA
3030	BUNDABERG	3160	PIALBA
3040	CAIRNS	3170	PROSERPINE
3050	CALOUNDRA	3180	ROCKHAMPTON
3060	CLEVELAND	3190	SANDGATE
3070	COMMERA	3200	SCARBOROUGH
3080	GLADSTONE	3210	SOUTHPORT
3090	GULF OF CARPENTARIA	3220	TEWANTIN
3100	HOME HILL	3230	THURSDAY ISLAND
3110	INGHAM	3240	TIN CAN BAY
3120	INNISFAIL	3250	TOWNSVILLE
3130	MACKAY	3260	WYNNUM
		3270	YEPPON

South Australia

Code	Port	Code	Port
4010	AMERICAN RIVER	4240	PT BROUGHTON
4020	ARDROSSAN	4250	PORT CLINTON
4030	ARNO BAY	4250	PT CLINTON
4040	BAIRDS BAY	4260	PORT KENNY
4050	BEACHPORT	4260	PT KENNY
4060	CAPE JAFFA	4270	PORT LINCOLN
4070	CAPE JERVI	4270	PT LINCOLN
4070	RAPID BAY	4280	PORT MACDONNELL
4080	CARPENTERS ROCKS	4280	PT MACDONNELL
4090	CEDUNA	4290	PORT NEILL
4090	THEVENARD	4290	PT NEILL
4100	COFFIN BAY	4300	PORT PIRIE
4110	CORNY POINT	4300	PT PIRIE
4120	COWELL	4310	PORT VICTORIA
4130	EDITHBURGH	4310	PT VICTORIA
4140	ELLISTON	4320	PT VINCENT
4150	FOWLERS BAY	4330	PORT WAKEFIELD
4160	KINGSCOTE	4330	PT WAKEFIELD
4170	KINGSTON	4340	ROBE
4180	MOONTA	4350	SMOKY BAY
4190	PENNESHAW	4360	SOUTH END
4200	POINT TURTON	4370	STANSBURY
4210	MARION BAY	4380	STREAKY BA
4210	PONDALOWIE BAY	4390	TUMBAY BAY
4210	SANDY PT (SA)	4400	VICTOR HARBOUR
4220	ADELAIDE	4410	WALAROO
4230	PORT AUGUSTA	4420	WHYALLA
4230	PT AUGUSTA	4500	VENUS BAY
4240	PORT BROUGHTON	4550	RAPID BAY

Tasmania

Code	Port	Code	Port
6010	BICHENO	6130	PORT SORELL
6020	BRIDPORT	6130	PT SORELL
6030	COLES BAY	6140	ST HELENS
6040	CURRIE	6150	SMITHTON
6045	DEVONPORT	6160	STANLEY
6050	DOVER	6170	STRAHAN
6060	DUNALLEY	6180	SWANSEA
6070	GORDON	6190	BEAUTY POINT
6080	HOBART	6190	LAUNCESTON
6090	KETTERING	6190	TAMAR
6100	LADY BARRON	6200	TRIABUNNA
6110	MARGATE	6210	WOODBIDGE
6120	PORT ARTHUR	6220	WYNYARD
6120	PT ARTHUR		

Western Australia

Code	Port	Code	Port
5010	ESPERANCE	5580	JURIEN BAY
5020	HOPETOUN	5590	SANDY PT (WA)
5030	DOUBTFUL ISLAND	5600	GREEN HEAD
5040	BREMER BAY	5610	SNAG ISLAND
5050	PALLINUP ESTUARY	5620	BEAGLE ISLAND
5060	BOAT HARBOUR EAST	5630	FRESHWATER POINT
5060	EAST BOAT HARBOUR	5680	PORT DENISON
5070	CHEYNE BEACH	5680	PT DENISON
5080	CAPE RICHE	5690	SEVEN MILE BEACH
5090	TWO PEOPLES BAY	5700	SOUTHGATE
5100	BETTYS BAY	5720	GERALDTON
5110	NANNARUP	5730	INNER PELSART GROUP
5120	NORMANS BEACH	5730	PELSART GROUP INNER
5150	ALBANY	5731	OUTER PELSART GROUP
5160	FRENCHMANS BAY	5731	PELSART GROUP OUTER
5170	TORBAY	5740	EASTER GROUP INNER
5190	WILSON INLET	5740	INNER EASTER GROUP
5200	LIGHTS BEACH	5741	EASTER GROUP OUTER
5210	PARRYS INLET	5741	OUTER EASTER GROUP
5220	BOAT HARBOUR WEST	5750	INNER WALLABI GROUP
5220	WEST BOAT HARBOUR	5750	WALLABI GROUP INNER
5240	IRWIN INLET	5751	OUTER WALLABI GROUP
5250	PEACEFUL BAY	5751	WALLABI GROUP OUTER
5270	BROOKES INLET	5760	INNER NORTH ISLAND
5280	WINDY HARBOUR	5760	NORTH ISLAND INNER
5290	HARDY INLET	5761	NORTH ISLAND OUTER
5300	HAMELIN BAY	5761	OUTER NORTH ISLAND
5310	MARGARET RIVER	5770	DRUMMOND COVE
5320	EAGLE BAY	5780	CORONATION BEACH
5330	QUINDALUP	5790	HORROCKS BEACH
5360	BUSSELTON	5800	PORT GREGORY
5370	BUNBURY	5800	PT GREGORY
5380	MANDURAH	5810	MURCHISON RIVER
5390	LONG POINT	5820	FALSE ENTRANCE
5400	SAFETY BAY	5830	SOUTH PASSAGE
5410	ROCKINGHAM	5840	PADDYS HARBOUR
5450	PERTH	5850	CAPE INSCRIPTION
5460	FREMANTLE	5860	KOKS ISLAND
5470	WHITFORDS BEACH	5870	DENHAM
5480	QUINNS ROCKS	5880	CARNARVON
5490	YANCHEP	5890	CAPE CUVIER
5500	WRECK POINT	5900	EXMOUTH GULF
5510	CAPE LESCHENAULT	5905	ONSLow
5520	LEDGE POINT	5910	POINT SAMSON
5530	LANCELIN	5915	PORT HEDLAND
5540	WEDGE ISLAND	5915	PT HEDLAND
5550	GREEN ISLE	5940	BROOME
5560	KANGAROO POINT	5950	DERBY
5570	CERVANTES ISLAND	5990	WYNDHAM

 Northern Territory

Code	Port	Code	Port
7010	AUGURUGU	7100	MILINGIMBI
7010	AUGURUGU MISSION	7100	MILINGIMBI MISSION
7020	BATHURST ISLAND	7110	PORT KEATS
7020	BATHURST ISLAND MISSION	7110	PORT KEATS MISSION
7030	BORROLOOLA	7110	PT KEATS MISSION
7040	CROKER ISLAND	7120	ROPER RIVER
7040	CROKER ISLAND MISSION	7120	ROPER RIVER MISSION
7050	DARWIN	7130	ROSE RIVER
7060	ELCHO ISLAND	7130	ROSE RIVER MISSION
7060	ELCHO ISLAND MISSION	7140	SNAKE BAY
7070	GARDEN POINT	7140	SNAKE BAY SETTLEMENT
7070	GARDEN POINT MISSION	7150	UMBAKUMBA
7080	GOULBURN ISLAND	7150	UMBAKUMBA MISSION
7080	GOULBURN ISLAND MISSION	7160	YIRRKALA
7090	MANINGRIDA	7160	YIRRKALA MISSION
7090	MANINGRIDA SETTLEMENT	7170	NHULUNBUY

Species codes

CAAB8	Group	Scientific name	Common name
37005000	Sharks	Hexanchidae - undifferentiated	sixgill and sevengill sharks (family code)
37005001	Sharks	Heptranchias perlo	sharpnose sevengill shark
37005002	Sharks	Notorynchus cepedianus	broadnose sevengill shark
37008000	Sharks	Odontaspidae - undifferentiated	grey nurse sharks (family code)
37008001	Sharks	Carcharias taurus	grey nurse shark
37008003	Sharks	Odontaspis ferox	sand tiger shark
37010000	Sharks	Lamnidae - undifferentiated	mackerel sharks (family code)
37010001	Sharks	Isurus oxyrinchus	shortfin mako shark
37012000	Sharks	Alopiidae - undifferentiated	thresher sharks (family code)
37012001	Sharks	Alopias vulpinus	thresher shark
37013002	Sharks	Parascyllium collare	collared carpet shark
37013003	Sharks	Orectolobus maculatus	spotted wobbegong
37014000	Sharks	Rhincodontidae - undifferentiated	whale sharks (family code)
37015000	Sharks	Scyliorhinidae - undifferentiated	catsharks (family code)
37015001	Sharks	Cephaloscyllium laticeps	draughtboard shark
37015007	Sharks	Cephaloscyllium fasciatum	reticulate swell shark
37015013	Sharks	Cephaloscyllium sp. A [in Last & Stevens	whitefin swell shark
37017000	Sharks	Triakidae - undifferentiated	hound sharks (family code)
37017001	Sharks	Mustelus antarcticus	gummy shark
37017008	Sharks	Galeorhinus galeus	school shark
37018000	Sharks	Carcharhinidae, Hemigaleidae - undifferen	whaler and weasel sharks (family code)
37018001	Sharks	Carcharhinus brachyurus	bronze whaler shark
37018022	Sharks	Galeocerdo cuvier	tiger shark
37019000	Sharks	Sphyrnidae - undifferentiated	hammerhead sharks (family code)
37019004	Sharks	Sphyrna zygaena	smooth hammerhead shark
37020000	Sharks	Squalidae - undifferentiated	dogfishes (family code)
37020001	Sharks	Centrophorus moluccensis	endeavour dogfish
37020002	Sharks	Dalatias licha	black shark
37020003	Sharks	Deania calcea	brier shark
37020004	Sharks	Deania quadrispinosa	longsnout dogfish
37020006	Sharks	Squalus megalops	piked spurdog
37020007	Sharks	Squalus mitsukurii	greeneye spurdog
37020008	Sharks	Squalus acanthias	white-spotted spurdog
37020010	Sharks	Centrophorus harrissoni	Harrison's dogfish
37020011	Sharks	Centrophorus uyato	southern dogfish
37020012	Sharks	Centroscymnus crepidater	golden dogfish
37020015	Sharks	Etmopterus pusillus	slender lantern shark
37020019	Sharks	Centroscymnus owstoni	Owston's dogfish
37021000	Sharks	Oxynotidae - undifferentiated	prickly dogfishes (family code)
37022000	Sharks	Echinorhinidae - undifferentiated	bramble sharks (family code)
37023000	Sharks	Pristiophoridae - undifferentiated	sawsharks (family code)
37023001	Sharks	Pristiophorus nudipinnis	southern sawshark
37023002	Sharks	Pristiophorus cirratus	common sawshark
37024000	Sharks	Squatinae - undifferentiated	angel sharks (family code)
37024001	Sharks	Squatina australis	Australian angel shark
37025000	Sharks	Pristidae - undifferentiated	sawfishes (family code)
37026000	Sharks	Rhynchobatidae - undifferentiated	sharkfin guitarfishes (family code)
37027000	Rays	Rhinobatidae - undifferentiated	shovelnose rays (family code)
37027002	Rays	Trygonorrhina fasciata	southern fiddler ray
37027006	Rays	Trygonorrhina sp. A [in Last & Stevens, 1	eastern fiddler ray
37027009	Rays	Aptychotrema rostrata	eastern shovelnose ray
37028000	Rays	Torpedinidae, Narcinidae, Hypnididae - un	torpedo rays and numbfishes (family code)
37031000	Rays	Rajidae - undifferentiated	skates (family code)
37031002	Rays	Raja australis	Sydney skate
37031005	Rays	Raja sp. A [in Last & Stevens, 1994]	longnose skate
37031006	Rays	Raja whitleyi	Melbourne skate

CAAB8	Group	Scientific name	Common name
37033000	Rays	Anacanthobatidae - undifferentiated	leg skates (family code)
37035000	Rays	Dasyatidae - undifferentiated	stingrays (family code)
37035002	Rays	Dasyatis thetidis	black stingray
37037000	Rays	Gymnuridae, Hexatrygonidae - undifferer	butterfly rays and sixgill stingrays (family code)
37038000	Rays	Urolophidae - undifferentiated	stingarees (family code)
37038002	Rays	Urolophus cruciatus	banded stingaree
37039000	Rays	Myliobatidae - undifferentiated	eagle rays (family code)
37039001	Rays	Myliobatis australis	southern eagle ray
37040000	Rays	Rhinopteridae - undifferentiated	cownose rays (family code)
37041000	Rays	Mobulidae - undifferentiated	devilrays (family code)
37042000	Sharks	Chimaeridae - undifferentiated	shortnose chimaeras (family code)
37042001	Sharks	Hydrolagus ogilbyi	Ogilby's ghostshark
37042005	Sharks	Chimaera sp. A [in Last & Stevens, 1994	southern chimaera
37043000	Sharks	Callorhynchidae - undifferentiated	elephant fishes (family code)
37043001	Sharks	Callorhynchus milii	elephant fish
37044000	Sharks	Rhinochimaeridae - undifferentiated	spookfishes (family code)
37044001	Sharks	Harriotta raleighana	bigspine spookfish
37044002	Sharks	Rhinochimaera pacifica	Pacific spookfish
37067000	Scalefish	Congridae - undifferentiated	conger eels (family code)
37067007	Scalefish	Conger verreauxi	[a conger eel]
37070000	Scalefish	Synphobranchidae - undifferentiated	basketwork eels (family code)
37070001	Scalefish	Diastobranchus capensis	[a basketwork eel]
37085000	Scalefish	Clupeidae - undifferentiated	herrings, sardines, pichards and sprats (family code)
37085002	Scalefish	Sardinops neopilchardus	pilchard
37086000	Scalefish	Engraulidae - undifferentiated	anchovies (family code)
37094000	Scalefish	Salmonidae - undifferentiated	true salmons and trouts (family code)
37120000	Scalefish	Chlorophthalmidae - undifferentiated	cucumberfishes (family code)
37120001	Scalefish	Chlorophthalmus nigripinnis	Montague mullet
37224000	Scalefish	Melanonidae, Moridae - undifferentiated	melanonids and morid cods (family code)
37226000	Scalefish	Gadidae, Phycidae - undifferentiated	cods and haddocks (family code)
37227000	Scalefish	Merlucciidae, Macruronidae - undifferenti	hakes and southern hakes (family code)
37227001	Scalefish	Macruronus novaezelandiae	blue grenadier
37228000	Scalefish	Aphyonidae, Bythitidae, Ophidiidae - und	lings (family code)
37228001	Scalefish	Dannevigia tusca	tusk
37228002	Scalefish	Genypterus blacodes	pink ling
37228008	Scalefish	Genypterus tigerinus	rock ling
37229000	Scalefish	Carapidae - undifferentiated	pearlfishes (family code)
37232000	Scalefish	Macrouridae - undifferentiated	rattails, whiptails and grenadiers (family code)
37232001	Scalefish	Caelorinchus australis	southern whiptail
37232004	Scalefish	Lepidorhynchus denticulatus	toothed whiptail
37232015	Scalefish	Coryphaenoides serrulatus	serrulate whiptail
37254000	Scalefish	Diretmidae - undifferentiated	spinyfins (family code)
37254001	Scalefish	Diretmichthys parini	[a spinyfin]
37255000	Scalefish	Trachichthyidae - undifferentiated	roughies and sawbellies (family code)
37255004	Scalefish	Gephyroberyx darwini	Darwin's roughy
37255009	Scalefish	Hoplostethus atlanticus	orange roughy
37257000	Scalefish	Anoplogasteridae - undifferentiated	fangtooths (family code)
37258000	Scalefish	Berycidae - undifferentiated	redfishes, nannygais and alfonsinos (family code)
37258001	Scalefish	Beryx decadactylus	imperador
37258002	Scalefish	Beryx splendens	alfonsino
37258003	Scalefish	Centroberyx affinis	redfish
37259000	Scalefish	Monocentrididae - undifferentiated	pineapplefishes (family code)
37264000	Scalefish	Zeidae - undifferentiated	dories (family code)
37264001	Scalefish	Cyttus traversi	king dory
37264002	Scalefish	Cyttus australis	silver dory
37264003	Scalefish	Zenopsis nebulosus	mirror dory
37264004	Scalefish	Zeus faber	John dory
37265000	Scalefish	Grammicolepididae - undifferentiated	scaly dories (family code)
37266000	Scalefish	Oreosomatidae - undifferentiated	oreo dories (family code)
37266001	Scalefish	Neocyttus rhomboidalis	spiky oreo

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37266003	Scalefish	<i>Pseudocyttus maculatus</i>	smooth oreo
37266004	Scalefish	<i>Allocyttus verrucosus</i>	warty oreo
37267000	Scalefish	Caproidae - undifferentiated	boarfishes (family code)
37268000	Scalefish	Lampridae - undifferentiated	moonfishes (family code)
37269000	Scalefish	Veliferidae - undifferentiated	veilfins (family code)
37269001	Scalefish	<i>Metavelifer multiradiatus</i>	veilfin
37271000	Scalefish	Trachipteridae - undifferentiated	ribbonfishes (family code)
37271001	Scalefish	<i>Trachipterus jacksonensis</i>	[a ribbonfish]
37277000	Scalefish	Aulostomidae - undifferentiated	trumpetfishes (family code)
37277001	Scalefish	<i>Aulostomus chinensis</i>	[a trumpetfish]
37278000	Scalefish	Fistulariidae - undifferentiated	flutemouths (family code)
37278002	Scalefish	<i>Fistularia petimba</i>	[a flutemouth]
37279000	Scalefish	Macroramphosidae - undifferentiated	bellowsfishes (family code)
37280000	Scalefish	Centriscidae - undifferentiated	razorfishes (family code)
37282000	Scalefish	Syngnathidae - undifferentiated	pipefishes and seahorses (family code)
37287000	Scalefish	Scorpaenidae - undifferentiated	coral scorpionfishes (family code)
37287001	Scalefish	<i>Helicolenus percoides</i>	reef ocean perch
37287046	Scalefish	<i>Trachyscorpia capensis</i>	cape scorpionfish
37287093	Scalefish	<i>Helicolenus barathri</i>	ocean perch
37288000	Scalefish	Triglidae - undifferentiated	gurnards, latchets and sea robins (family code)
37288001	Scalefish	<i>Chelidonichthys kumu</i>	red gurnard
37288002	Scalefish	<i>Lepidotrigla papilio</i>	southern spiny gurnard
37288003	Scalefish	<i>Lepidotrigla vanessa</i>	butterfly gurnard
37288005	Scalefish	<i>Pterygotrigla andertoni</i>	spotted gurnard
37288006	Scalefish	<i>Pterygotrigla polyommata</i>	latchet
37288008	Scalefish	<i>Lepidotrigla mulhalli</i>	deepwater gurnard
37290000	Scalefish	Aploactinidae - undifferentiated	velvetfishes (family code)
37292000	Scalefish	Gnathanacanthidae, Pataecidae - undifferentiated	red velvetfishes and prowfishes (family code)
37296000	Scalefish	Platycephalidae - undifferentiated	flatheads (family code)
37296001	Scalefish	<i>Neoplatycephalus richardsoni</i>	tiger flathead
37296002	Scalefish	<i>Neoplatycephalus conatus</i>	deepwater flathead
37296003	Scalefish	<i>Platycephalus bassensis</i>	sand flathead
37296004	Scalefish	<i>Platycephalus fuscus</i>	dusky flathead
37296007	Scalefish	<i>Platycephalus caeruleopunctatus</i>	blue-spotted flathead
37296037	Scalefish	<i>Platycephalus speculator</i>	southern flathead
37296038	Scalefish	<i>Platycephalus marmoratus</i>	[a flathead]
37297000	Scalefish	Hoplichthyidae - undifferentiated	ghost flatheads (family code)
37297001	Scalefish	<i>Hoplichthys haswelli</i>	[a ghost flathead]
37309000	Scalefish	Pegasidae - undifferentiated	seamoths (family code)
37310000	Scalefish	Centropomidae, Chandidae - undifferentiated	snooks and barramundi, and glassfishes (family code)
37311000	Scalefish	Percichthyidae, Serranidae - undifferentiated	temperate basses and rock cods (family code)
37311001	Scalefish	<i>Lepidoperca pulchella</i>	eastern orange perch
37311002	Scalefish	<i>Caesioperca lepidoptera</i>	butterfly perch
37311003	Scalefish	<i>Caesioperca rasor</i>	barber perch
37311004	Scalefish	<i>Callanthias allporti</i>	Allport's perch
37311006	Scalefish	<i>Polyprion oxygeneios</i>	hapuku
37311052	Scalefish	<i>Lepidoperca occidentalis</i>	slender orange perch
37311055	Scalefish	<i>Callanthias australis</i>	splendid perch
37326000	Scalefish	Priacanthidae - undifferentiated	bigeyes (family code)
37326001	Scalefish	<i>Priacanthus macracanthus</i>	red bigeye
37327000	Scalefish	Apogonidae, Dinolestidae - undifferentiated	cardinalfishes and long-finned pike (family code)
37330000	Scalefish	Sillaginidae - undifferentiated	whitings (family code)
37330001	Scalefish	<i>Sillaginodes punctata</i>	King George whiting
37330014	Scalefish	<i>Sillago flindersi</i>	eastern school whiting
37334000	Scalefish	Pomatomidae - undifferentiated	tailor (family code)
37334002	Scalefish	<i>Pomatomus saltatrix</i>	tailor
37335000	Scalefish	Rachycentridae - undifferentiated	black kingfishes (family code)
37335001	Scalefish	<i>Rachycentron canadum</i>	black kingfish
37337000	Scalefish	Carangidae - undifferentiated	trevallies and jacks (family code)
37337002	Scalefish	<i>Trachurus declivis</i>	cowanyoung
37337003	Scalefish	<i>Trachurus novaezelandiae</i>	yellowtail scad

CAAB8	Group	Scientific name	Common name
37337007	Scalefish	<i>Seriola hippos</i>	samson fish
37337062	Scalefish	<i>Pseudocaranx dentex</i>	silver trevally
37338000	Scalefish	Coryphaenidae - undifferentiated	dolphinfishes (family code)
37340000	Scalefish	Menidae - undifferentiated	moonfishes (family code)
37341000	Scalefish	Leiognathidae - undifferentiated	ponyfishes (family code)
37342000	Scalefish	Bramidae - undifferentiated	pomfrets (family code)
37342001	Scalefish	<i>Brama brama</i>	pomfret
37343000	Scalefish	Caristiidae - undifferentiated	veilfins (family code)
37344000	Scalefish	Arripidae - undifferentiated	Australian salmon (family code)
37344004	Scalefish	<i>Arripis truttaceus</i>	western Australian salmon
37345000	Scalefish	Emmelichthyidae - undifferentiated	bonnetmouths (family code)
37346000	Scalefish	Caesionidae, Lutjanidae - undifferentiated	sea perches and snappers (family code)
37347000	Scalefish	Nemipteridae - undifferentiated	threadfin and monocle breams (family code)
37350000	Scalefish	Haemulidae - undifferentiated	grunter breams (family code)
37351000	Scalefish	Lethrinidae - undifferentiated	emperors and sea breams (family code)
37353000	Scalefish	Sparidae - undifferentiated	breams (family code)
37353001	Scalefish	<i>Pagrus auratus</i>	snapper
37353004	Scalefish	<i>Acanthopagrus australis</i>	yellowfin bream
37353013	Scalefish	<i>Rhabdosargus sarba</i>	tarwhine
37354000	Scalefish	Sciaenidae - undifferentiated	jewfishes (family code)
37354001	Scalefish	<i>Argyrosomus hololepidotus</i>	mulloway
37355000	Scalefish	Mullidae - undifferentiated	goatfishes (family code)
37355001	Scalefish	<i>Upeneichthys lineatus</i>	blue-lined goatfish
37361000	Scalefish	Kyphosidae, Scorpididae - undifferentiated	drummers and sweeps (family code)
37361004	Scalefish	<i>Scorpis aequipinnis</i>	sea sweep
37366000	Scalefish	Enoplosidae - undifferentiated	old wives (family code)
37367000	Scalefish	Pentacerotidae - undifferentiated	boarfishes (family code)
37367002	Scalefish	<i>Paristiopterus labiosus</i>	giant boarfish
37367003	Scalefish	<i>Pentaceropterus recurvirostris</i>	long-snouted boarfish
37367004	Scalefish	<i>Pentaceros decacanthus</i>	bigspine boarfish
37367005	Scalefish	<i>Zanclistius elevatus</i>	blackspot boarfish
37369000	Scalefish	Oplegnathidae - undifferentiated	knifejaws (family code)
37369002	Scalefish	<i>Oplegnathus woodwardi</i>	conway
37371000	Scalefish	Cichlidae - undifferentiated	cichlids (family code)
37377000	Scalefish	Cheilodactylidae - undifferentiated	morwongs (family code)
37377002	Scalefish	<i>Nemadactylus douglasii</i>	grey morwong
37377003	Scalefish	<i>Nemadactylus macropterus</i>	jackass morwong
37377009	Scalefish	<i>Cheilodactylus fuscus</i>	red morwong
37378000	Scalefish	Latrididae - undifferentiated	trumpeters (family code)
37378001	Scalefish	<i>Latris lineata</i>	striped trumpeter
37378002	Scalefish	<i>Latridopsis forsteri</i>	bastard trumpeter
37380000	Scalefish	Cepolidae - undifferentiated	bandfishes (family code)
37381000	Scalefish	Mugilidae - undifferentiated	mulletts (family code)
37382000	Scalefish	Sphyraenidae - undifferentiated	pikes (family code)
37383000	Scalefish	Polynemidae - undifferentiated	threadfin salmon (family code)
37384000	Scalefish	Labridae - undifferentiated	wrasses (family code)
37385000	Scalefish	Odacidae - undifferentiated	cales and weed whittings (family code)
37386000	Scalefish	Scaridae - undifferentiated	parrotfishes (family code)
37400000	Scalefish	Uranoscopidae - undifferentiated	stargazers (family code)
37439000	Scalefish	Scombrobracidae, Gempylidae - undifferentiated	mackerels and gemfishes (family code)
37439001	Scalefish	<i>Thyrsites atun</i>	barracouta
37439002	Scalefish	<i>Rexea solandri</i>	gemfish
37439003	Scalefish	<i>Ruvettus pretiosus</i>	escolar
37439009	Scalefish	<i>Rexea antefurcata</i>	longfin gemfish
37440000	Scalefish	Trichiuridae - undifferentiated	hairtails (family code)
37440002	Scalefish	<i>Lepidopus caudatus</i>	ribbonfish
37440004	Scalefish	<i>Trichiurus lepturus</i>	large-headed hairtail
37441000	Scalefish	Scombridae - undifferentiated	mackerels and tunas (family code)
37441001	Scalefish	<i>Scomber australasicus</i>	blue mackerel
37442000	Scalefish	Xiphiidae - undifferentiated	broadbill swordfishes (family code)
37442001	Scalefish	<i>Xiphias gladius</i>	broad-billed swordfish

CAAB8	Group	Scientific name	Common name
37444000	Scalefish	Istiophoridae - undifferentiated	marlins and sailfishes (family code)
37445000	Scalefish	Centrolophidae - undifferentiated	trevallas (family code)
37445001	Scalefish	Hyperoglyphe antarctica	blue-eye trevalla
37445002	Scalefish	Tubbia tasmanica	Tasmanian rudderfish
37445005	Scalefish	Seriolella brama	blue warehou
37445006	Scalefish	Seriolella punctata	silver warehou
37445011	Scalefish	Seriolella caerulea	white warehou
37445014	Scalefish	Schedophilus labyrinthica	ocean blue-eye
37460000	Scalefish	Bothidae, Achiropsettidae, Paralichthyida	lefteye flounders (family code)
37461000	Scalefish	Pleuronectidae - undifferentiated	righteye flounders (family code)
37462000	Scalefish	Soleidae - undifferentiated	soles (family code)
37463000	Scalefish	Cynoglossidae - undifferentiated	tongue soles (family code)
37464000	Scalefish	Triacanthidae, Triacanthodidae - undiffer	tripodfishes and deepwater tripodfishes (family code)
37465000	Scalefish	Balistidae, Monacanthidae - undifferentia	triggerfishes and leatherjackets (family code)
37465005	Scalefish	Meuschenia scaber	velvet leatherjacket
37465006	Scalefish	Nelusetta ayraudi	ocean jacket
37465036	Scalefish	Meuschenia freycineti	six-spined leatherjacket
37466000	Scalefish	Ostraciidae - undifferentiated	boxfishes (family code)
37467000	Scalefish	Tetraodontidae - undifferentiated	toadfishes (family code)
37468000	Scalefish	Triodontidae - undifferentiated	pufferfishes (family code)
37469000	Scalefish	Diodontidae - undifferentiated	porcupine fishes (family code)
37470000	Scalefish	Molidae - undifferentiated	ocean sunfishes (family code)