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Standardising data collection across the southern rock lobster fisheries of South Australia, Victoria and Tasmania

A. Linnane[1] and P. Walsh[2]

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FRDC PROJECT NO. 2008/003

SARDI Aquatic Sciences
PO Box 120 Henley Beach SA 5022

July 2011

Final Report to the Fisheries Research and Development Corporation

Government of South Australia

Australian Government
Fisheries Research and Development Corporation

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1 NON TECHNICAL SUMMARY

2008/003 Standardising data collection across the southern rock lobster fisheries of South Australia, Victoria and Tasmania

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OBJECTIVES:

1. Establish requirements for standardised data collection, storage, manipulation and reporting across the rock lobster fisheries of South Australia, Tasmania and Victoria.
2. Identify opportunities for database standardisation across the three States to enable a common operating environment for storage and use of data.
3. Identify operationally feasible, cost effective methods of data collection and delivery through Electronic Logbook Automation.

OUTCOMES ACHIEVED TO DATE

The fishery for southern rock lobster (*Jasus edwardsii*) occurs across South Australia, Victoria and Tasmania. Management, industry and research agencies have identified the need to investigate areas where standardisation and automation of data collection could be of benefit. This report describes the data collection programs that directly relate to the management of the resource in each State and identifies key areas where standardisation can be achieved. This was undertaken by assessing the various programs against specific criteria relating to data collection, entry, storage, processing, analysis and reporting. Recommendations for standardisation were made based on assessment outcomes and overall benefit to the fisheries. It is envisaged that this will result in more coherent cross-jurisdictional research and co-operative resource management.

Through an extensive consultation process with various stakeholders, the project identified and reinforced the benefits of electronic data capture. In particular, each fishery highlighted the need for finer scale spatial data as a research priority. As a result, various options for electronic logbook implementation were reviewed through a workshop to assess needs for each fishery and capability of different options. This assessment was undertaken against a range of operating criteria established in consultation with industry, research and management. Recommendations were made regarding the operational standards required to achieve success in adopting an automated data collection system.

Southern rock lobster *Jasus edwardsii* are distributed around southern mainland Australia, Tasmania and New Zealand. They are primarily found in limestone reef systems or isolated granite formations that provide ideal lobster habitat in the form of protective crevices or ledges. In south-eastern Australia, the resource supports important regional fisheries across the States of South Australia, Victoria and Tasmania. The total annual catch ranges from 3,500-4,000 tonnes with an estimated gross commercial value of ~AUS$200 million.

A range of programs exist in each State that underpins the effective management and sustainable utilisation of rock lobster resources. Broadly, they can be categorised under stock assessment, quota monitoring and licensing and bycatch/protected species monitoring.

This report describes the monitoring programs currently in place across South Australia, Victoria and Tasmania and uses a workflow and data management analysis to determine the areas most suitable for standardisation across the three States. The report also investigates the potential adoption of electronic data collection mechanisms based on assessment and recommendations from industry, management and research groups.

Our findings identified considerable scope for standardisation of catch sampling and puerulus monitoring programs across south-eastern Australia based on almost identical collection forms and program designs within each State. There is also potential for standardisation of catch and effort logbook programs given similar recording and reporting systems. However, existing data storage and processing systems differ and in Tasmania and Victoria are strongly linked to licensing and quota management. Nonetheless, the close similarities between existing catch and effort, bycatch/byproduct and endangered/protected species programs suggests that future benefits can be achieved by consolidating all three components into a single data collection and storage system. We suggest that in terms of data collection, standardisation can be achieved by introducing electronic logbooks that adhere to specific assessment criteria outlined in this report.

While quota monitoring programs are broadly similar across jurisdictions and show some potential for standardisation, the added complexity associated with compliance makes standardisation difficult. However, the potential benefits that can be achieved by fully automating quota monitoring data collection processes on board vessels warrant further investigation. The strong relationship between licensing systems and legislation in all States combined with limited benefits associated with standardisation of those systems, leads us to conclude there is minimal benefit to be achieved from standardising these programs.

Criteria for the implementation of an electronic data collection system were identified at a workshop for south-eastern rock lobster fisheries. These were a) utilises a touch screen interface robust enough to use on deck b) causes minimal interruption of the fishing operation c) uses wireless communication (Mobile/Satellite network) for uploading data and downloading software updates d) provides real time (or near time on a minimum daily basis) data e) interacts with existing database systems f) collects data directly linked to the management of the fishery g) receives inputs from a wide variety of sensors (eg. RFID reader, temperature sensor, GPS) and h) is easily modified to respond to changes in data requirements. Systems were identified to meet these criteria and future research should involve at-sea trials where further testing can be undertaken.

KEYWORDS: Southern rock lobster, *Jasus edwardsii*, data standardisation, monitoring programs; electronic data collection

2 BACKGROUND

Southern rock lobster *Jasus edwardsii* are distributed around southern mainland Australia, Tasmania and New Zealand (Phillips, 2006). They are primarily found in limestone reef systems or isolated granite formations that provide ideal lobster habitat in the form of protective crevices or ledges. In south-eastern Australia, the resource supports important regional fisheries across the States of South Australia, Victoria and Tasmania (Figure 3.1). Each State is sub-divided into fishing blocks for statistical and management purposes that acknowledge known spatial differences in the biological characteristics of *J. edwardsii*. In South Australia, these are referred to as “marine fishing areas”, in Tasmania as “stock assessment areas” while in Victoria they are termed “fishing zones”. The total annual catch across all States ranges from 3,500-4,000 tonnes with an estimated gross commercial value of ~AUS$200 million (Knight and Tsolos, 2009). Fishing methods have not changed markedly over time and generally consist of baited pots that are set individually overnight and hauled at first light.

All three fisheries are managed under management plans that have been separately developed under State legislation within each jurisdiction. Despite this, the management tools utilised are broadly similar across each region. These include input controls such as limited entry to the fishery, gear limitations and spatial or temporal closures, as well as output controls in the form of minimum legal sizes (MLSs) and total allowable commercial catches (TACCs) (e.g. Sloan and Crosthwaite 2007).

A range of programs exist in each State that underpins the effective management and sustainable utilisation of rock lobster resources. Broadly, they can be categorised under stock assessment, quota monitoring and licensing and bycatch/protected species monitoring. The primary information underpinning stock assessments are data gathered through logbook programs which became mandatory across south-eastern Australia during the 1970s. These include estimates of catch and effort by zone and management sub-region which are used to calculate catch rate usually expressed as kg of legal lobster/potlift (Linnane et al. 2009 a,b; Gardner & Ziegler 2010). In addition, logbook data are enhanced by information from voluntary catch sampling programs where additional data such as catch rates of undersized lobsters are provided. Fishery independent monitoring programs are also conducted in each State which involves attaining catch and effort data from predetermined fixed site surveys. Data from both fishery dependent and independent sources are used to generate outputs from specifically designed rock lobster fishery models which further underpin stock

assessment analyses (Hobday and Punt, 2001; McGarvey and Matthews, 2001). Typically these include estimates of biomass, egg production, exploitation rate and recruitment.

Puerulus monitoring has been undertaken in across south-eastern South Australia since the early 1970s but quantified estimates of settlement did not develop until the 1990s. Initially, research was driven by the twin aims of understanding both long-term settlement trends and early life history morphology. The focus of puerulus monitoring was extended in the 1980s with the success in Western Australia of using levels of puerulus settlement to predict recruitment to the western rock lobster (*Panulirus cygnus*) fishery three and four years later (Phillips et al., 2000). An emerging relationship also appears evident in *J. edwardsii*, namely in Tasmania (Gardner et al., 2001) and New Zealand (Booth and McKenzie, 2009) where periods between settlement and recruitment range from five to seven years depending on the fishing region. Using a combination of biological and hydrodynamic modelling, Bruce et al. (2007) simulated the planktonic early life history of *J. edwardsii* across its geographical range. Importantly, the study found that the Southern Zone fishery of South Australia had the highest levels of egg production in southern Australia and based on oceanographic systems, was an important source of puerulus for much of the overall south-eastern fishery.

Bycatch and protected species reporting are also important programs within each State jurisdiction. As part of the requirement under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*, fishers must report any wildlife and protected species interactions encountered within any of the assessed State managed fisheries to the relevant fishery management authority and the Commonwealth Department of Environment and Heritage (DEH). This is generally undertaken through a dedicated Threatened, Endangered and Protected Species (TEPS) logbook scheme which differs regionally. In addition, routine daily bycatch levels within fishing pots can be reported on a voluntary basis within mandatory logbooks. Levels of bycatch are also recorded on a daily basis as part of onboard observer or voluntary catch sampling programs.

Licensing of commercial fisheries occurs to ensure the commercial harvest of the fishery is within ecologically sustainable levels. Within south-eastern Australia, commercially licensed fishers are allocated an individual transferable quota (ITQ) which stipulates the amount of legal-sized fish a commercial fisher can legally take. Within quota management systems there are numerous management tools which include documentation that must be completed by the fisher and processor to assist in compliance monitoring of the fishery management arrangements. Across the fisheries, catch and disposal records are completed by fishers and sales and transfer documentation are completed by fish processors. Both of these documents are vital components of the quota management system and assist in ensuring integrity of the quota system by enabling compliance staff to audit the level of take.

The overall aim of this report is to firstly describe the stock assessment, quota and licensing and bycatch monitoring programs currently in place across South Australia, Victoria and Tasmania. Secondly, the report provides a workflow and data management analysis to determine, for each data source, the areas most suited to cross-State standardisation. In doing so, we also aim to highlight the barriers restricting standardisation within each program area. Finally, we investigate the potential adoption of electronic data collection mechanisms across rock lobster fishing fleets within south-eastern Australia. Specifically, we present the recommendations from industry, management and scientific leaders based on a dedicated workshop held as part of the project which aimed to identify the most suitable, cost effective method of electronic data capture.

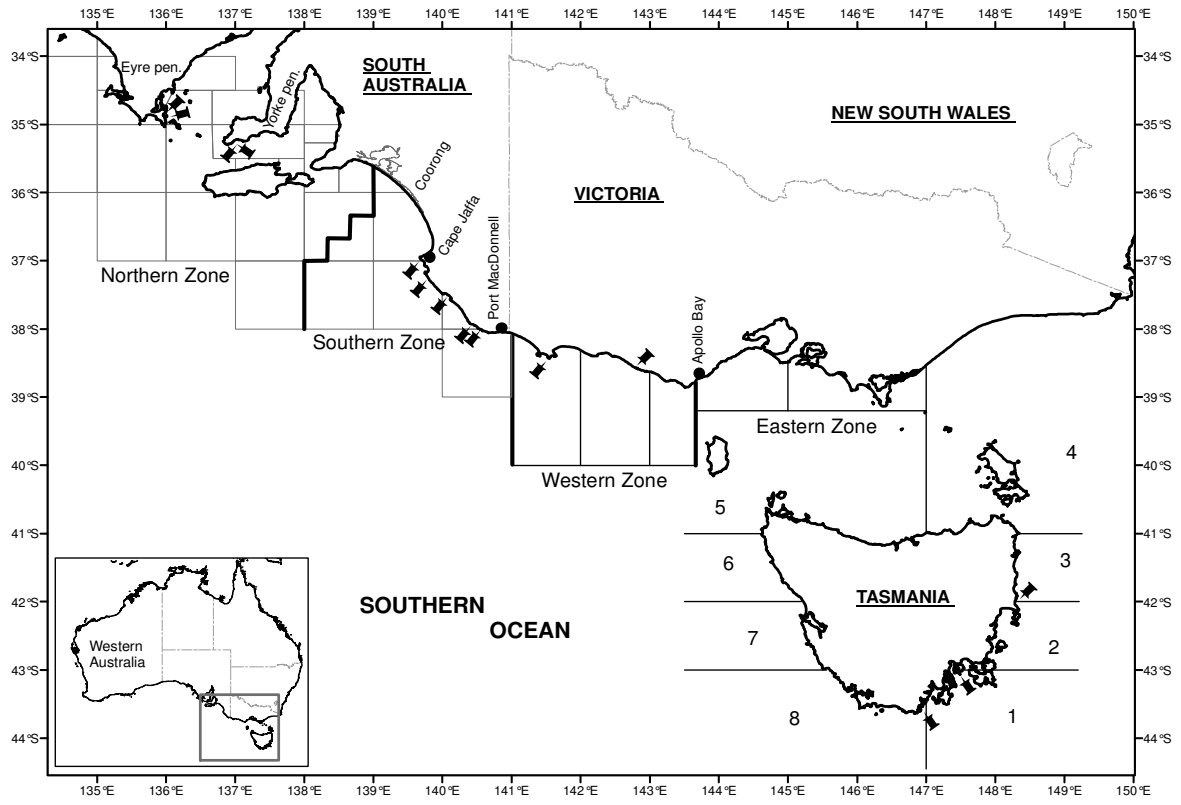

Figure 2.1: Southern rock lobster fisheries of South Eastern Australia. Symbols indicate areas of puerulus monitoring. Numbers in Tasmania represent specific management sub-regions.

3 NEED

The primary focus of this project is to address recommendations by the Department of Environment and Heritage (DEH) aimed at strengthening the effectiveness of the management arrangements for the South Australian Rock Lobster Fishery (SARLF), namely:

> *"PIRSA to pursue complementary management arrangements with other Australian jurisdictions responsible for managing southern rock lobster fisheries to ensure that all removals and other relevant impacts on the stock are properly accounted for in stock assessments*."

This project also responds to increased demand for accuracy, efficiency and timeliness of data in relation to:

- Management (Stock Assessment delivery and increased research accuracy through the use of fine scale data)
- Industry (Efficient quota management, easier log book management, automation of industry programs such as Clean Green and provision of feedback systems such as quota statistics)
- Research (optimising opportunities for collaboration across jurisdictions and associated sharing of data and modelling)
- Ecological Assessment (increased bycatch and protected species recording in a consistent and automated manner)
- Increased focus on fine scale spatial data for fisheries management across all of the above groups.

4 OBJECTIVES

The objectives of this project were to:

- Establish requirements for standardised data collection, storage, manipulation and reporting across the rock lobster fisheries of South Australia, Tasmania and Victoria.
- Identify opportunities for database standardisation across the three States to enable a common operating environment for storage and use of data.
- Identify operationally feasible, cost effective methods of data collection and delivery (Automation).

5 METHODS

To achieve the stated objectives through improved data management requires significant increases in:

- accuracy (by collecting greater amounts of data where required and at a finer scale across all data categories);
- efficiency (by enabling automation of data collection and analysis and achieving economies of scale through collaboration across jurisdictions-particularly in management and research of the fishery and
- timeliness (by automation of data processing tasks).

In order to identify opportunities to achieve these, two principal methodologies were adopted:

- Existing process and data management analysis. This focused on documenting data management related processes used in the fishery and identifying similarities, differences and areas for possible standardisation.
- Data Collection Automation Solution Evaluation. This focused on systematically assessing data collection solutions from several vendors in order to identify and implement criteria for an automated (or semi-automated) data collection system.

Throughout the project, stakeholders were proactively engaged to ensure input from all parties to address their particular needs.

5.1 Data Standardisation

5.1.1 Process and Data Management Analysis

The range of programs underpining the effective management and sustainable utilisation of rock lobster resources across south-eastern Australia can be broadly categorised as:

- Catch & Effort Logbook
- Catch Sampling and Independent Monitoring
- Puerulus Monitoring
- Bycatch /Byproduct
- Protected Species
- Licensing
- Quota Monitoring

Details of the above programs in each State are provided in Appendix 1. The information provided was collected during a series of interviews with stakeholders in each State (see Table 6.1). In order to assess the standardisation capability of each program and to

determine existing and potential areas of compatibility between jurisdictions, the following data were incorporated:

- **Workflow (business process)**

Even where the same data are collected and similar schema are used, it is possible for collection methods to vary. This workflow provided an indication of differences in collection practices used between each jurisdiction.

- **Cost of Operation**

This section provides indicative costs and other resource data for maintaining the collection program.

- **Technology used**

This provided a brief summary of technology used in the collection and storage of the data (such as RDBMS, telephony systems or data loggers).

- **Variables recorded**

This provided the information required to determine the extent to which each jurisdiction was collecting the same information. Information recorded included the variable name, units of measure (for quantitative variables) or descriptive categories (for qualitative data) where applicable and any general information useful in determining the compatibility between systems.

- **Database schema**

This provided an indication of the storage methods, the data schema design used and the compatibility between systems from each jurisdiction.

- **Legislative requirements**

This provided details of related legislation, particularly where it may be a barrier to standardisation.

- **Other Contributing Information**

Where applicable, other contributing information was recorded (such as systems development currently underway or planned).

Table 5.1 Details of stakeholder meetings during the course of the project.

Date	Location	Attendees	Details
10/08/2009	Hobart	Caleb Gardner and Peter Walsh (TAFI)	Collated information on Tasmanian catch sampling and logbook processes in detail.
13/08/2009	Melbourne	Peter Walsh (TAFI) James Andrews, Dave Hobday, Dave Reilly, Fabian Trinnie, Anne Gason (DPI Vic)	Discussed project and collection of data for workflow analysis.
8/09/2009	Hobart	Peter Walsh (TAFI) John Adams (DPIWE Tas)	Discussed general requirements for workflow analysis.
14/09/2009	Hobart	Peter Walsh (TAFI) Adrian Linnane (SARDI)	Discussed methods for process evaluation, progressing data acquisition solution selection, article for SRL Ltd.
15/09/2009	Hobart	Peter Walsh (TAFI) John Adams (DPIWE Tas)	Collated information on Tasmanian quota monitoring in detail and requirements for process evaluation. Also discussed some aspects of industry consultation.
24/11/2009	Phone	Peter Walsh (TAFI) Adrian Linnane (SARDI)	Discussed article for SRL Ltd
3/12/2009	Adelaide	Peter Walsh (TAFI) Justine Kenyon-Benson, (PIRSA) Kelly Crosthwaite (PIRSA), Adrian Linnane (SARDI)	Collated information on South Australian quota monitoring process in detail. Also collated South Australian licensing process. Discussed meeting with Industry reps from SA Southern Zone (SEPFA). Developed initial assessment criteria for electronic log book solutions.
16/12/2009	Mt Gambier	Peter Walsh (TAFI), Justine Kenyon-Benson (PIRSA), Melanie Snart (PIRSA), Kelly Crosthwaite (PIRSA), Lianos Triantafillos (PIRSA) Adrian Linnane (SARDI) Justin Phillips (JP Consulting) Joel Redman (Commercial fisher), Dave Manser (Commercial fisher)	Based on the rock lobster fisheries technology workshop held at SARDI Aquatic Sciences on July 28th 2009, four data acquisition solutions, were discussed in relation to a range of selection criteria. Further information in relation to two of the technologies were requested with a view towards further testing of these specific technologies.
16/12/2009	Mt Gambier	Peter Walsh (TAFI), Kylie Davis (SARDI), Peter Hawthorne (SARDI), Adrian Linnane (SARDI)	Collated information on South Australian catch sampling, logbook and puerulus sampling processes in detail.
17/12/2009	Melbourne	Peter Walsh (TAFI) Dave Hobday (DPI Vic)	Collated information on Victorian catch sampling, logbook, quota monitoring and puerulus monitoring processes in detail.
05/03/2010	Hobart	Peter Walsh (TAFI), CFAC Members	Presentation to Tasmanian CFAC on project status and potential outcomes.
18/03/2010	Adelaide	Adrian Linnane (SARDI), Kelly Crosthwaite (PIRSA), Peter Walsh (TAFI)	Project update and discussed various aspects of data collection and management in South Australia.
30/03/2010	Hobart	Peter Walsh (TAFI), James Parkinson (DPIPWE)	Project update and discussed various aspects of data collection and management in Tasmania, particularly in relation to existing and proposed data collection systems.

5.2 Electronic Logbook

5.2.1 Development of Assessment Criteria

Assessment criteria were developed for evaluation of various electronic logbook systems presented at a dedicated Electronic Data Capture Workshop held at SARDI Aquatic Sciences on July 28th, 2009. The aim of the workshop was to assess the extent of rock lobster fishery data currently being collated across all three States and discuss options for the future implementation of electronic data capture systems. Criteria were developed in consultation with management and industry representatives over two meetings and tested against the systems presented.

Presentations at the workshop included those from from Ian Knuckey (OLRAC), Richard Bland (Absolute Software), Jason Beveridge (Control Corp) and Phil Richards (Macquarie University). Primary assessment criteria were related to the usability of each system on board the vessel and involved ensuring that a) the fishing operation was not significantly impeded while fishers used the system and (b) ongoing functionality of the system was guaranteed following changes to the underlying data schema or business processes. In particular, it was highlighted that any data collection system that significantly impeded the fishers operation would receive limited support.

Other significant criteria were related to ensuring improved outcomes through the use of data collection automation technology or overall cost benefit.

5.2.2 Application of Assessment Criteria

Electronic logbook solutions were evaluated against the selection criteria in consultation with management and industry representatives.

6 RESULTS/DISCUSSION

6.1 Data Standardisation

6.1.1 Process and Data Management Analysis

Appendix 1 details the information underpinning the process and data management analysis of each program below.

6.1.1.1 Quota Monitoring

While the information collected for quota monitoring is very similar between jurisdictions, the process of collecting and reporting data and the procedures used for compliance monitoring differ considerably (See Appendix 4.1 through 4.4).

South Australia uses different systems in the Southern and Northern fishing zones. In the Southern zone (Figure 13.1), a semi-automated system, incorporating automatic weighing scales at landing points with video monitoring for compliance and telephone reporting, is currently being implemented in addition to manual catch and disposal records. The Northern zone (Figure 13.5) uses a combination of VMS, manual catch and disposal records and telephone prior reporting. Victoria (Figure 13.8) uses manual forms and a phone reporting system enabling some automated data collection in terms of catch and effort while Tasmania (Figure 13.10) uses a combination of forms and phone reporting.

For all States, information recorded includes license details, date/time, weight and number of lobster unloaded and number remaining on-board or in cauf. Catch and disposal quota monitoring data are used to verify monthly catch totals as recorded in catch and effort logbook data.

6.1.1.2 Catch and Effort Logbook

Logbook operations in each jurisdiction were identified as highly compatible, collecting similar mandatory data (catch by weight and number, number of pot lifts, depth and fishing area) and voluntary information (which includes criteria such as mortalities, by-catch, number of berried females and high grading discards). All jurisdictions use similar, manual (hardcopy) data collection processes (Figures 13.13; 13.17 and 13.20) which are submitted to the relevant State agencies on a monthly basis before being entered manually into a database application (See Appendix sections 4.5 through 4.7).

However, while data collection methods are comparable between States, the database applications into which information are entered differ considerably (See “Technology Used” in Appendix sections 4.5 through 4.7). In South Australia, the South Australian Rock Lobster (SARL) database is Oracle based and independent of other administrative systems related to the fishery. In Tasmania, Oracle is also used, however, this database is linked to, and

dependent on, licensing, quota management and compliance systems used in the fishery. In Victoria, a Scientific Information Retrieval (SIR) database system is used and is in turn linked to, and dependent on, the Fisheries Integrated Licensing System (FILS).

Logbook data are used to generate temporal and spatial trends in catch and effort data, which form the basis for annual stock assessment reports in each State. These are highly comparable and generally involve a time series of catch rate (kilograms of legal catch per pot lift) trends by zone and/or specific fishing region. In addition, logbook data are used for input into rock lobster fishery models. In recent years, all States have moved to using a similar stock assessment model (ROCK; Hobday and Punt, 2001) which allows for known biological variation in each region. Typical outputs in each State include estimates of biomass, egg production, exploitation rate and recruitment.

6.1.1.3 Catch Sampling and Independent Monitoring

Catch sampling allows fishers and researchers to record additional fishery data not normally entered into log books and may be undertaken outside known fishing areas. Data collected includes size frequency of the catch and other biological data such as sex, colour, undersize numbers and estimates of bycatch (See Appendix sections 4.8 through 4.10).

Sampling is carried out using several closely related methodologies in each jurisdiction and can be summarised as:

- fishery independent catch sampling (involving researchers collecting sample data independent of the fishery operation, e.g. along pre-determined fixed site transect lines or in marine protected areas);
- commercial sampling (either performed voluntarily by the fisher or researcher on a commercial boat) and
- fisher recapture programs (commercial or recreational fishers recording information about tagged animals).

Catch sampling data is generally recorded at finer spatial scales than catch and effort logbook data. For example, exact latitude and longitude of each pot sampled are recorded in catch sampling programs. Catch sampling generally displayed a high degree of compatibility in the variables recorded between States.

Data collection is generally performed manually in all regions (Figures 13.23; 13.25 and 13.27) with the exception being the occasional use of electronic callipers in South Australia and Tasmania. While the collection methods are the same, the database systems used differ significantly between States (See “Technology Used” in Appendix sections 4.8 through 4.10). In South Australia, catch sampling data is directly entered into SARL, in Victoria data are

entered into SAS data files while in Tasmania, data are managed in *Craybase*, a Windows based application developed for an Oracle database.

Outputs from catch sampling data are used to supplement logbook catch and effort information in annual stock assessment reports. They typically include estimates of size frequency distributions, pre-recruit indices (no. of undersized/potlift), bycatch estimates and catch rates of dead or spawning lobsters.

6.1.1.4 Puerulus Monitoring

Puerulus monitoring is undertaken monthly in each State (See Appendix section 4.11). Its purpose is to attempt to predict future recruitment to the fishery based on puerulus settlement indices. The collectors and sampling methodology used are identical across South Australia, Victoria and Tasmania (Figure 13.30). However, database technology differs significantly between States with Victoria using SAS data files, Tasmania using a windows based application developed for an Oracle database and South Australia using a Windows Microsoft Excel based database.

Puerulus settlement indices are presented in annual stock assessment reports where varying time lags between settlement and recruitment are used based on differences in growth rates across each State. Refer to Figure 3.1 for sample site locations.

6.1.1.5 Bycatch/Byproduct

In all jurisdictions, bycatch/byproduct data are collected as part of the catch and effort logbook and catch sampling programs (and as such are not documented separately in Appendix 4, see catch and effort, Figures 13.13; 13.17 and 13.20). Recording bycatch is not mandatory, with the exception of some byproduct species (eg. giant crab and octopus).

For catch and effort logbook data, South Australia (Figure 13.15) and Victoria (Figure 13.19) record the top three species species caught as bycatch/byproduct while Tasmania (Figure 13.22) records the top four. For catch sampling data, all bycatch/byproduct species are recorded.

6.1.1.6 Protected/Endangered Species

In South Australia, protected/endangered species information is collected independently using a wildlife interaction logbook (Figure 13.16), while in Victoria (Figure 13.19) and Tasmania (Figure 13.22), it is collected as part of the catch and effort logbook system.

Information recorded for protected/endangered species is almost identical in each State and includes date, time, location, species, number caught and the type of interaction.

6.1.1.7 Licensing

While licensing data was originally considered part of this project, it became apparent the legislative requirements associated with licensing would be a considerable barrier to standardisation and no further analysis of data management systems was carried out.

6.1.2 Process and Data Management Compatibility Summary

Table 7.1 gives recommendations for data standardisation based on our assessment of compatibility between data management systems in each State. Each program is assessed against the various stages of data management.

Given that catch and effort log book data is broadly similar across South Australia, Victoria and Tasmania, there is a clear case for standardisation of data collection and entry systems. As a result, we recommend that this recording process could potentially be standardised using electronic logbooks. However, existing data storage and processing systems differ, and in Tasmania and Victoria, are strongly linked to licensing and quota management. While the systems differ in architecture, all systems used allow the format of extracted data to be transferable, e.g. as text data files. As a result, there is no impediment to the standardisation of data reporting for catch and effort data across the three States.

Catch sampling and puerulus monitoring are considered to display a high degree of compatibility between jurisdictions and, therefore, the most likely candidates for standardisation. This is based on the fact that current catch sampling and puerulus monitoring data forms and program designs are almost identical across each of the three States.

The potential for recording of catch sampling data to be standardised across States using an on-board electronic data capture system is strong. The nature of puerulus sampling programs does not warrant the development of electronic capture systems.

In addition, the design of catch sampling and puerulus monitoring programs are controlled by research agencies thus having a high degree of autonomy from other stakeholders. This in turn results in discrete data management systems that are favourable to standardisation without considerable impact on other systems i.e. catches sampling and puerulus monitoring systems are not linked to licensing, quota management or other data management systems used in these fisheries.

Bycatch/Byproduct monitoring is also considered a strong candidate for standardised data collection as part of a similar process for standardisation and/or automation of the catch and effort logbook process. Similarly, this may involve standardisation of only the data collection and data entry processes with customised outputs feeding into existing, different database systems.

Despite the fact that threatened, endangered and protected species are recorded using different systems in each State (i.e. through the logbook process in Tasmania and Victoria but through a dedicated wildlife interaction logbook in South Australia), the potential for standardisation using an electronic logbook should be investigated. This is highlighted by the low frequency of reporting and relatively simple nature of the databases involved.

While the complexity and differences between quota management systems in each State make standardisation a difficult process (particularly with the added complication of compliance), consideration must be given to the benefits that could arise out of implementing full electronic processing of all data collection on board vessels. As a result, it may be possible to automate and standardise the process of quota management data collection and produce customised outputs for each State matching compliance and database requirements.

Table 6.1: Assessment of compatibility between South Australia, Victoria and Tasmania for southern rock lobster data management program stages. A tick indicates compatibility between jurisdictions for the specified stage of data management.

Standardisation Matrix	Catch & Effort (Logbook)	Catch Sampling	Puerulus monitoring	Bycatch /Byproduct	Protected Species	Licensing	Quota Monitoring
Data Collection	✓	✓	✓	✓	✓	×	✓
Data Entry	✓	✓	✓	✓	✓	×	✓
Data Storage	×	✓	✓	×	×	×	×
Data processing and analysis	×	✓	✓	×	×	×	×
Data reporting	✓	✓	✓	✓	✓	×	✓

6.1.3 Recommendations

- The relevant organisations pursue standardisation of systems used for catch sampling and puerulus monitoring. Initial efforts should be to adopt the same data model (i.e. standardisation of variables collected) across all jurisdictions.

- Relevant organisations agree to pursue standardised data collection (preferably using electronic logbook systems) for catch and effort logbook (including bycatch/byproduct and protected/endangered species monitoring) and quota monitoring systems.

- It is highly recommended, as new systems are developed, all systems utilise true relational database management systems (e.g. Microsoft SQL Server or Oracle RDBMS). Such systems provide features for maximising data integrity and security unavailable in file based systems (such as Excel or SAS).

6.2 Electronic Logbook

6.2.1 Summary of Available Systems

Four data collection solutions were presented at the Electronic Data Capture Workshop held at SARDI Aquatic Sciences on July 28th, 2009 (Table 6.2). Each were subsequently considered and assessed as potential candidates for future evaluation.

6.2.1.1 Lobster Boat Data Terminal (Control Corp)

The lobster boat data terminal manufactured by Control Corp comprises a robust touch screen terminal and separate data processing unit. Conceptually, the touch screen terminal can be mounted on the deck (near the fishing operation) while the processing unit can be housed inside the wheel house.

The data processing unit is capable of reading several external devices such as a GPS or RFID tag reader. Jason Beveridge (CEO Control Corp) presented a scenario where an RFID reader would detect a pot (with an embedded RFID tag) coming on-board, relay the information to the data processing unit, which would record the pot position via attached GPS and prompt the fisher for catch details via the touch screen terminal. As the fisher returns to port, information is automatically collated and sent to a server via mobile phone connection (this could also be achieved via satellite connection) without intervention on the part of the fisher. Conversely, automated software updates are made whenever the unit establishes contact with the network allowing enhancements and bug fixes to be applied to the system easily.

According to Control Corp, data entry via the touch screen is configured using a simple workflow based software making customisation simple and cost effective.

While this solution shows considerable promise, some concern was expressed at the size of the company to provide ongoing support for the system. Additionally, the most cost effective solutions utilised the mobile phone network, which may limit its application.

6.2.1.2 OlFish (Ocean and Land Resource Assessment Consultants-OLRAC)

OLFish is a software only solution and runs on standard Windows PC's or can be adapted for hand held devices (allowing robust units to be used on deck close to the fishing operation). The software is highly configurable and adaptable but while customisation of the system could be provided without charge, the annual license cost of the software could be prohibitive. OLRAC are a stable service provider with a considerable number of customers worldwide.

6.2.1.3 e-forms (Absolute Software)

The Absolute Software eforms solution uses a ruggedised data entry terminal on the deck of the boat (near the fishing operation) in the form of a Windows Mobile device. It is capable of using sensor mesh, mobile phone or satellite networks for uploading data and can attach other sensors and readers as required. This system would allow a similar operation to that recommended for the Control Corp Lobster Boat Data Terminal.

Absolute Software is a well established service provider offering stability for future support.

The Windows Mobile operating system, while being relatively stable, can tend to be overly complex and error prone during prolonged periods of use which may have detrimental implications for the application intended here.

6.2.1.4 Remote Catch Entry (Concept Only, Phil Richards)

This system was originally considered as a concept in 2004, and has been raised as a potential solution aimed at "producing a simple system that ensured data integrity/security and seamless transmission to both SARDI and PIRSA compliance".

While the system is only conceptual, it provides a number of useful ideas and some insight into how industry would like this type of system to function. Key attributes of the system included:

- Simplicity to account for varying skills of fishery participants.
- Adaptability to changing data collection requirements.
- Robustness to match the outdoor environment in which it is to be used.
- Seamless & secure notification of daily catch to both the fisherman & service providers.
- Designed specifically for, and with input from, industry.

Importantly, the unit could be compatible with the existing automated scale and compliance monitoring systems in use in South Australia operating over a wireless link from a remote

data entry unit housed on the boat or in a convenient position near the hauling area. The unit can communicate with a land based system via wireless connection.

6.2.2 Development of Assessment Criteria

Primary, critical assessment criteria related to functionality of the solution were:

- **Robust**: System hardware must be robust enough to use on the deck of the boat to enable data entry during pot lifts.
- **Simple to use**: Usability is key to ensuring fishers enter data in a consistent manner that will ensure the quality and integrity of the data.
- **Adaptable**: Flexible enough to adapt for differences in work practices between States and to be upgraded when work practices or business processes change.
- **Data Quality:** Provides improvements in data quality and scale (particularly spatial data).
- **Data Volume:** Increased volume of data resulting in commensurate probability of confidence in research findings.
- **Linked to the management of the fishery**: Data collected can be directly related to the management of the fishery and linked to industry feedback

Secondary criteria:

- **Operates in real time (or near real time)**: in order to minimise delays in information processing and analysis.
- **Compatible**: Links to existing systems where necessary.
- **Efficiency across other data users**: (Research/Compliance/Management/Industry)
- **Can result in economies of scale**: Generally achieved through wide implementation across multiple jurisdictions
- **Setup Costs**: may impact on the feasibility from a cost/benefit perspective or be prohibitive for broad scale implementation.

6.2.3 Applying the Assessment Criteria

Each of the data collection automation solutions were evaluated against the assessment criteria during a dedicated meeting with management and industry stakeholders held in Mt Gambier, South Australia in December of 2009 (Table 6.2). It should be highlighted that the assessment only reflects the views of those who attended the meeting based on their evaluation of each system during the Electronic Data Capture Workshop held in July of 2009. As a result, this part of the project is as much about testing the applicability of the criteria to an assessment process as it is about the individual systems.

Table 6.2 Evaluation of various electronic data capture systems against specified criteria.

Criteria	Lobster Boat Data Terminal (Control Corp)	OlFish (OLRAC)	e-Forms (Absolute Software)	Remote Catch Entry (Phil Richards)
Robust	✓	✓	✓	✓
Simple to use	✓	×	✓	✓
Adaptable	✓	✓	✓	✓
Data quality	✓	✓	✓	✓
Data volume	✓	✓	✓	✓
Linked to management	✓	✓	✓	✓
Operates in real time (or near real time)	✓	✓	✓	✓
Compatible	✓	✓	✓	✓
Efficiency across users	✓	✓	✓	✓
Economies of scale	✓	×	Unknown	Unknown
Setup costs	✓	×	Unknown	Unknown

6.2.4 Recommendations

Following discussion with stakeholders, it was agreed that any future rock lobster electronic data collection system should:

- Utilise a touch screen interface robust enough to use on deck.
- Cause minimal interruption of the fishing operation.
- Use wireless communication (Mobile/Satellite network) for uploading data and downloading software updates.
- Provide real time (or near time on a minimum daily basis) data.
- Interact with existing database systems.
- Collect data directly linked to the management of the fishery.
- Receive inputs from a wide variety of sensors (eg. RFID reader, temperature sensor, GPS).
- Be easily modified to respond to changes in data requirements.

Conceptually, the recommended electronic data collection solution would be similar to the system shown in Figure . The following steps could provide the basis for data collection processing:

1. Each pot hauled aboard would contain an electronic signature (this could be in the form of an RFID tag or similar device) that would trigger the beginning of the data collection process.

2. A connected GPS would be interrogated to pinpoint the pots position.

3. A robust data entry terminal (situated on the deck of the boat and next to the fishing operation) would respond to the pot detection (in step 1 above) and prompt the fisher for information. Initially, this would be simple (e.g. legal size count, undersize count and mortality count), but, as the fisher becomes accustomed to using the terminal, could be expanded to include bycatch/byproduct and protected species information.

4. The fisher would manually finalise data collection at completion of a days fishing or before landing (possibly entering quota docket information).

5. As the vessel comes into mobile phone range, data would be transmitted over the mobile phone network and automatically validated and entered into a catch and effort and quota management databases. Simultaneously, software updates required for electronic capture would be uploaded to the vessel.

6. Data would be further validated and processed (human intervention). This would include compliance checks against other quota monitoring activity.

7. Fishers would have access (through the terminal or the internet) to get feedback from the database systems. This may take the form of catch/effort statistics or quota balance.

8. Data would be immediately accessible to researchers and managers at a much finer spatial scale than previously available.

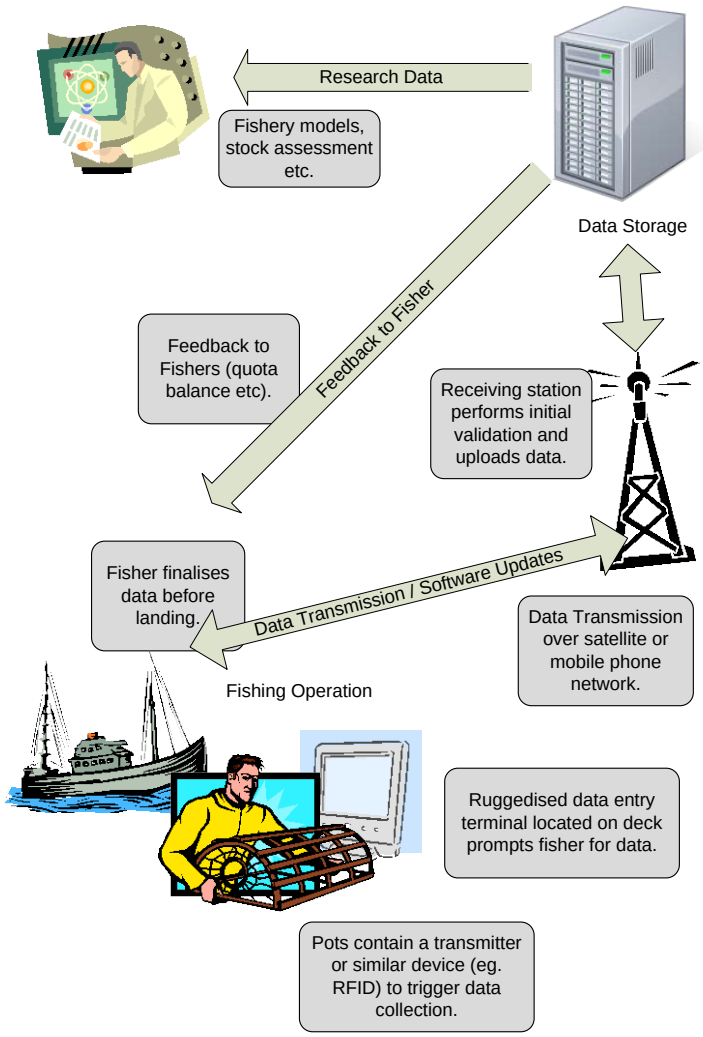

Figure 6.2 Conceptual electronic data collection solution.

7 BENEFITS AND ADOPTION

Significant benefits can be achieved through the standardisation of data management and the use of electronic logbook systems. In particular, the following research, management and industry agencies will benefit directly from the project:

- South Australian Research and Development Institute (SARDI)
- Tasmanian Aquaculture and Fisheries Institute (TAFI)
- Department of Primary Industries (DPI Victoria)
- Primary Industries and Resources of South Australia (PIRSA)
- Department of Primary Industries, Parks, Water and Environment (DPIPWE Tasmania)
- Southern Rock Lobster LTD (SRL)
- South East Professional Fishermans Association (SEPFA)
- Tasmanian Rock Lobster Fishermen's Association (TRLFA)
- Northern Zone Rock Lobster Fisherman's Association (NZRLFA)
- Victorian Rock Lobster Association (VRLA)

8 FURTHER DEVELOPMENT

Recommendations for further development of this research are:

- Establishing trials of catch and effort logbook automation using electronic data capture (fitting the criteria recommended in 6.2.2) and standardisation of data collected and associated processes (incorporating recording of bycatch/byproduct and endangered, protected species interaction).
- Standardisation of catch sampling and puerulus data by:
    - Clarifying terminology with the same meaning (eg. “fishery independent monitoring” and “catch sampling” can have the same meaning in South Australia and Tasmania respectively);
    - Standardising data dictionaries (eg. ensuring categories have the same agreed meaning) and
    - Standardising data schemes (ensuring data is easily interchangeable between databases).
- Further investigation of utilising electronic logbooks for quota monitoring (acknowledging the complexity and differences between quota management and compliance systems in each State).

More specifically, future projects would identify a product (or products) capable of delivering the concept described in 7.2.4. This would involve undertaking at-sea trials on a small number of boats within the fishing fleet. Prior to, and in conjunction with this study, a cost benefit analysis and implementation strategy would be developed. In this case, implementation incorporates:

- Use of third party services for QA/QC and data validation;
- Once validated, data are transferred into existing rock lobster database systems in each jurisdiction (such as SARL and Craybase);
- Data are then processed and made available to a range of data visualisation tools. This may incorporate a specific web based system allowing individual license holders, scientists and managers to download catch and effort data in real time.

9 PLANNED OUTCOMES

This project has identified key areas where standardisation of data management can be achieved across the jurisdictions of South Australia, Victoria and Tasmania including:

- Automation of catch and effort logbook data (including bycatch/byproduct and endangered/protected species interactions).
- Automation of voluntary catch sampling data.
- Standardisation of catch sampling database systems.
- Standardisation of puerulus monitoring processes and database systems.
- Potential standardisation and automation of quota monitoring systems.

With regard to electronic logbook systems, this project identified the criteria for assessing on board automated data logging systems and a number of potential service providers as examples of what the market can provide. This information can now be used to formulate the requirements of a larger project for trials of electronic logbook systems in the fishery.

10 CONCLUSION

After considering all aspects of data management across each South Australia, Victoria and Tasmania in relation to southern rock lobster fisheries, it can be concluded that:

- There is considerable scope for standardisation of catch sampling and puerulus monitoring programs across the jurisdictions. This is based on the fact that current catch sampling and puerulus monitoring data forms and program designs are almost identical between States.

- Given that catch and effort log book data is broadly similar across South Australia, Victoria and Tasmania; there is a clear case for standardisation of data collection and entry systems. In addition, the close association between existing catch and effort, bycatch/byproduct and endangered/protected species programs suggests that future benefits can be achieved by combining all three components into a single data collection system.

- While quota monitoring systems are broadly similar across jurisdictions and show some potential for standardisation, the added complexity associated with compliance makes standardisation difficult. However, the potential benefits that can be achieved by fully automating data collection processes on board vessels warrant further investigation.

- The strong relationship between licensing systems and legislation in each State combined with limited benefits associated with standardisation of those systems, suggests that no further investigation is warranted.

- Standardisation of rock lobster management programs across south-eastern Australia will clearly benefit from electronic data capture systems. The technology required to achieve this is currently available but needs to be developed to meet the specifications detailed in this report. Future research should be aimed at selecting available systems and trialling them on-board commercial vessels for detailed evaluation.

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12 ACKNOWLEDGEMENTS

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13 APPENDIX

Appendix 1 Intellectual Property

Intellectual Property and Valuable Information

During the course of this project no applications for patents were made. This publication is protected by copyright. Apart from any use as permitted by the Copyright Act 1968, no part may be reproduced without written permission.

Appendix 2 Staff

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Appendix 3 Acronyms

DEH	Department of Environment and Heritage
DPIPWE	Department of Primary Industries, Parks, Water and Environment
DPI Vic	Department of Primary Industries Victoria
EPBC	Environmental Protection and Biodiversity Conservation
GPS	Global Positioning System
IMAS	Institute for Marine and Antarctic Studies
ITQ	Individual transferable quota
MLS	Minimum legal size
NZRLFA	Northern Zone Rock Lobster Fisherman's Association
OLRAC	Ocean and Land Resource Assessment Consultants
PIMS	Primary Industries Information Management System
PIRSA	Primary Industries and Resources of South Australia
RDBMS	Relational database management system
RFID	Radio frequency identification
SARDI	South Australian Research and Development Institute
SARLF	South Australian Rock Lobster Fishery
SAS	Statistical analysis Systems
SEPFA	South East Professional Fishermans Association
SRL	Southern Rock Lobster
TACC	Total allowable commercial catch
TAFI	Tasmanian Aquaculture and Fisheries Institute
TEPS	Threatened, Endangered and Protected Species
TRLFA	Tasmanian Rock Lobster Fishermen's Association
VRLA	Victorian Rock Lobster Association

Appendix 4: Documentation of the Requirements Analysis

4.1 South Australian Quota Monitoring (Southern Zone)

General

This documents the quota monitoring process in the South Australian Southern Zone Rock Lobster fishery.

Workflow

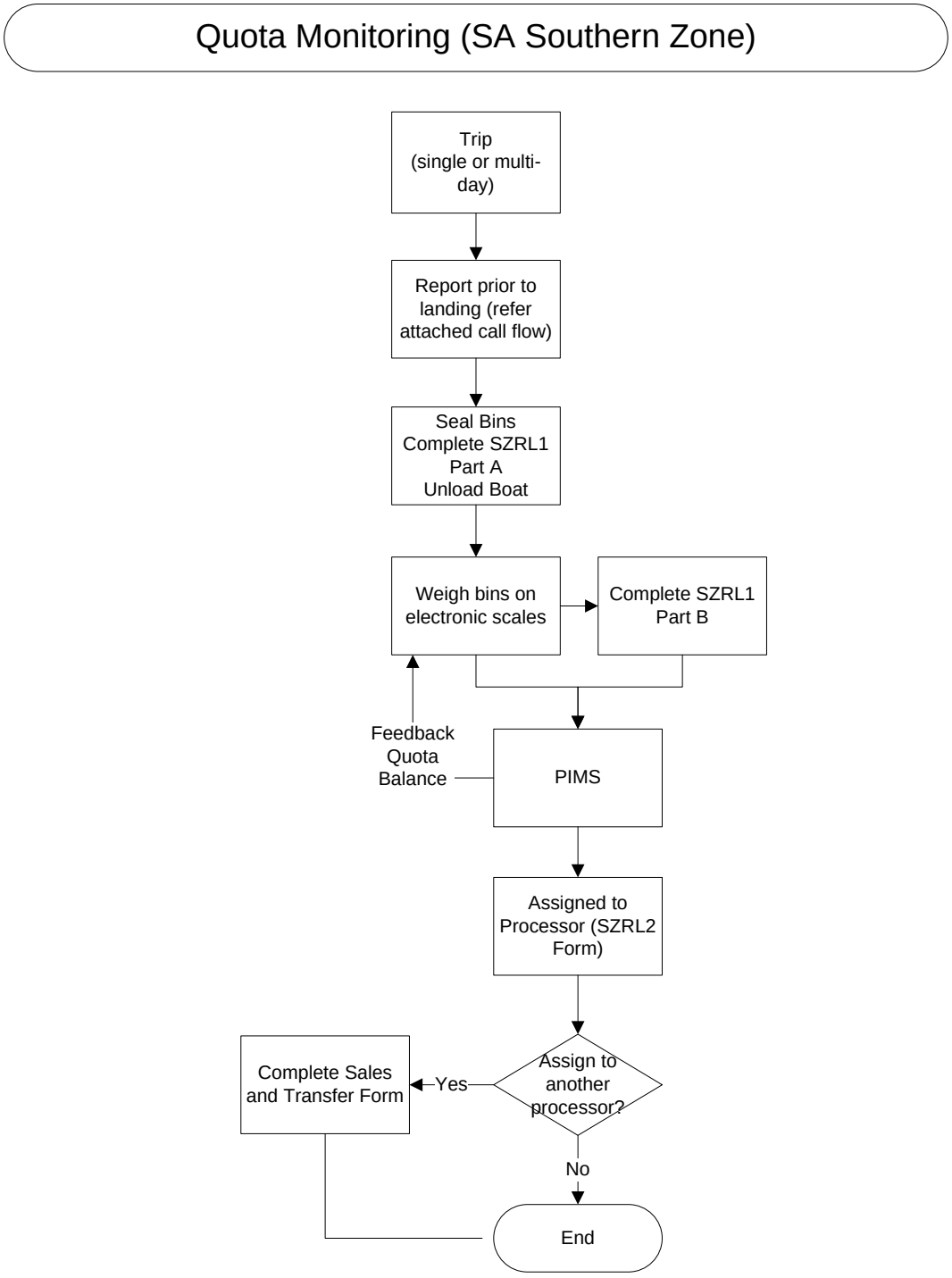


Figure 13.1: Quota Monitoring Workflow in South Australia (Southern Zone)

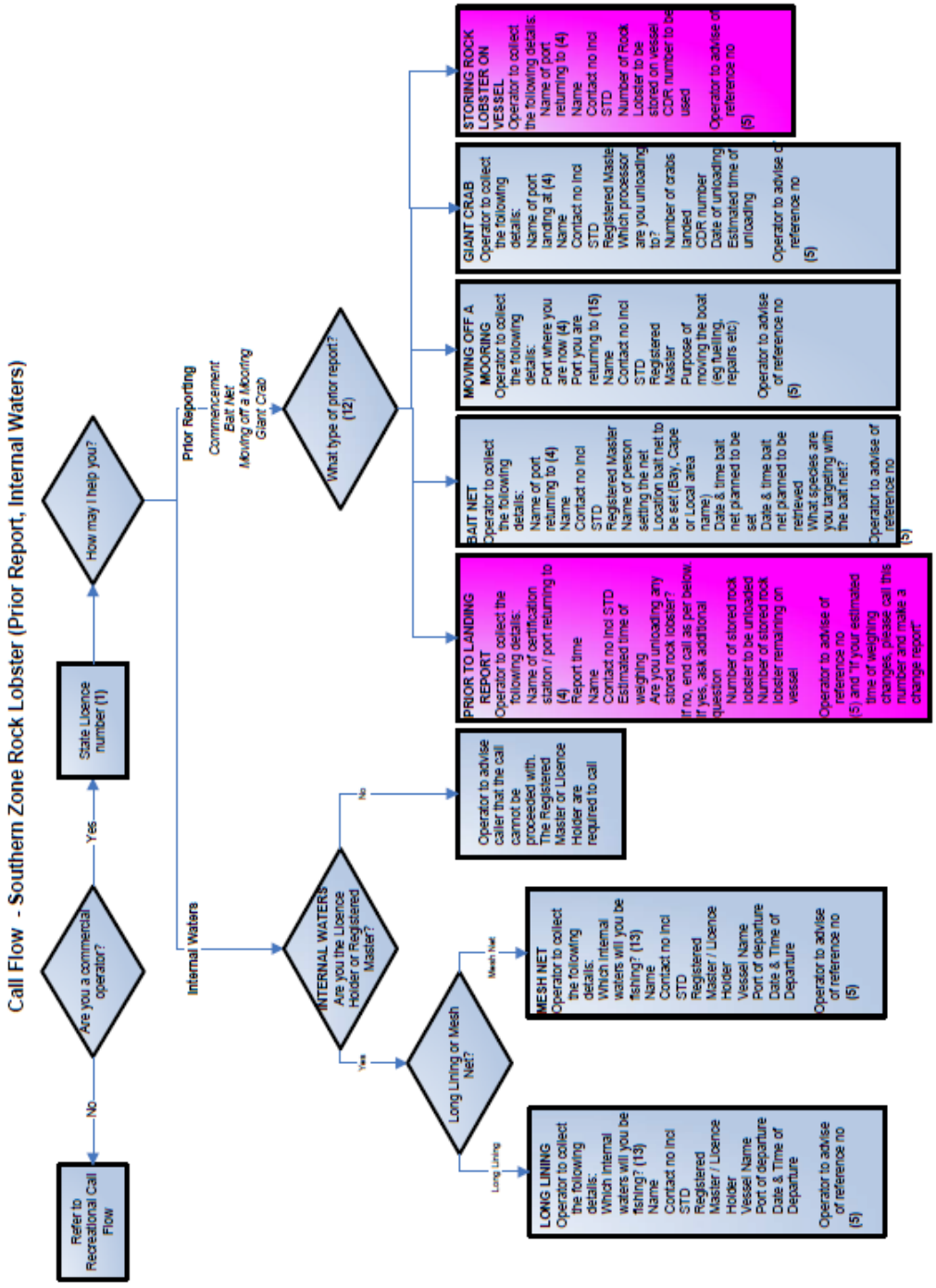


Figure 13.2: Prior reporting call management workflow (Southern Zone)

Cost of Operation

South Australia operates a full cost recovery model for management of the Rock Lobster fishery estimated annually based on program requirements.

Technology Used

See attached form "Southern Zone Rock Lobster Catch and Disposal Record". Parts A and B are completed manually. Part B is also completed as part of an automated process using electronic scales (there are 7 sets of scales at landing sites in the southern zone). Each bin has an RFID tag for

identification and data for the bin is entered and transferred via the mobile phone network. The operation is monitored by compliance officers via video link. This system was installed by ControlCorp. Data is stored in an Oracle database with an Oracle front end application.

Variables Recorded

Form SZRL1 (Catch & Disposal Record Part A)

- Prior Report Reference Number
- Licence Number
- Date/Time
- Certification Station Code
- Number of lobster landed
- Number of bins landed
- Number of lobster stored on vessel
- Number of lobster taken home
- Number of giant crab landed
- First/Last bin tag numbers

Form SZRL1 (Catch & Disposal Record Part B)

- Rock lobster taken (kg)
- Giant crab taken (kg)
- Certification Date/Time

Form SZRL2 (Rock Lobster Purchase Record)

- Date/Time
- Licence Number
- RLSTF (see below)/SZRL1 Number
- Supplier Name
- Supplier Address
- Receiver Name
- Receiver FP or FX Number
- Receiver Address
- Rock Lobster Weight (kg)
- Rock Lobster Number
- Rock Lobster Price/kg
- First/Last bin tag numbers

Form RLSTF (Rock Lobster Sales and Transfer)

- Date/Time
- Transaction Type (Sale/Transfer)
- Supplier Name
- Supplier Location
- Receiver Name
- Receiver Location
- Rock Lobster Live (kg)
- Rock Lobster Cooked (kg)
- Rock Lobster Tails (kg)
- Rock Lobster Other (kg)

Purchase Zone (Southern/Northern/Other)

Number of receptacles containing rock lobster

Data Schema

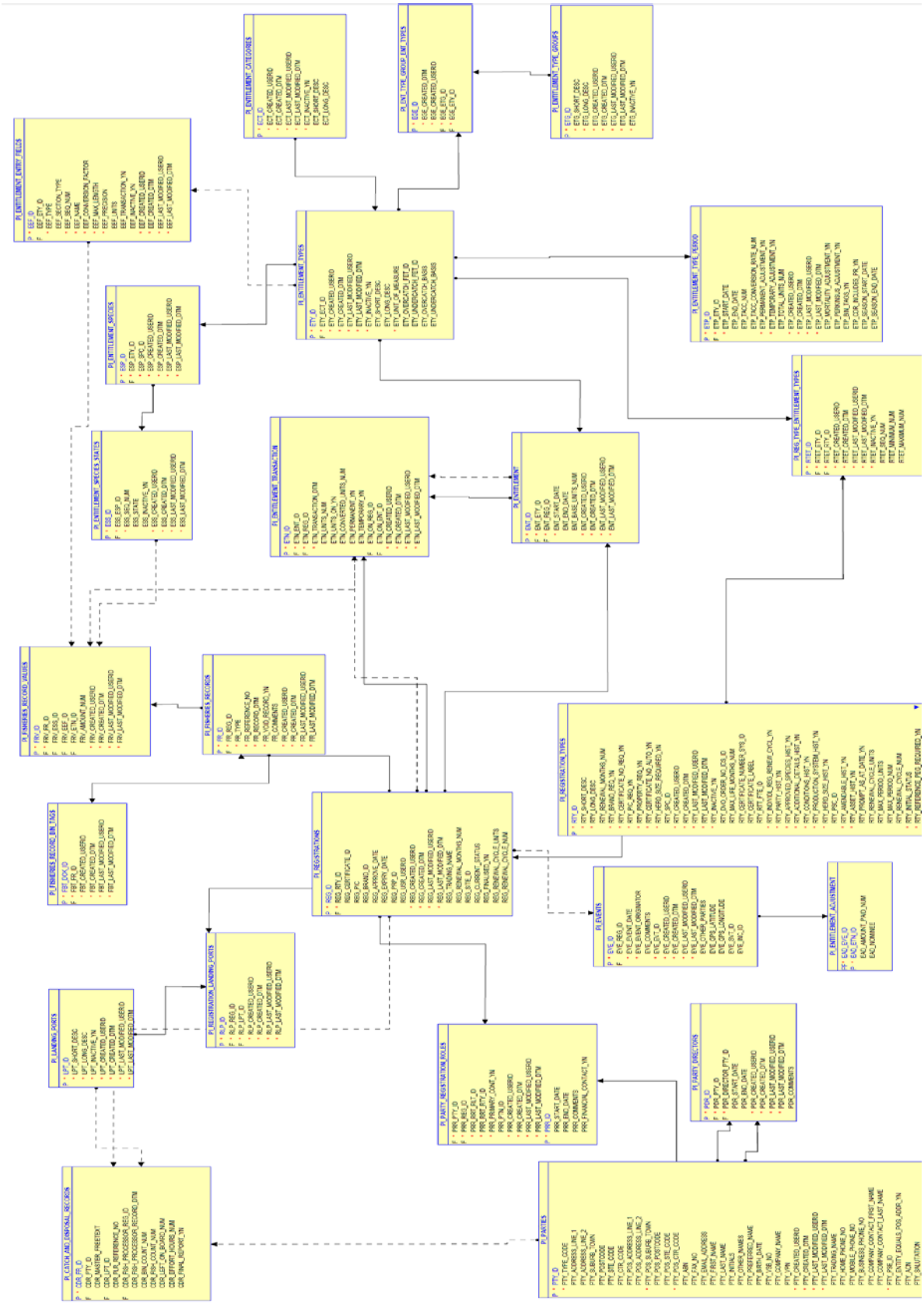


Figure 13.3: Quota monitoring database schema (South Australia)

Legislative Requirements

Details on relevant legislation pertaining to the South Australian Rock Lobster Fishery can be found at the following web sites:

- http://www.legislation.sa.gov.au/LZ/C/A/FISHERIES%20MANAGEMENT%20ACT%202007/CURRENT/2007.4.UN.PDF
- http://www.legislation.sa.gov.au/LZ/C/R/FISHERIES%20MANAGEMENT%20(GENERAL)%20REGULATIONS%202007.aspx
- http://www.legislation.sa.gov.au/LZ/C/R/FISHERIES%20MANAGEMENT%20(ROCK%20LOBSTER%20FISHERIES)%20REGULATIONS%202006.aspx

Planned Changes

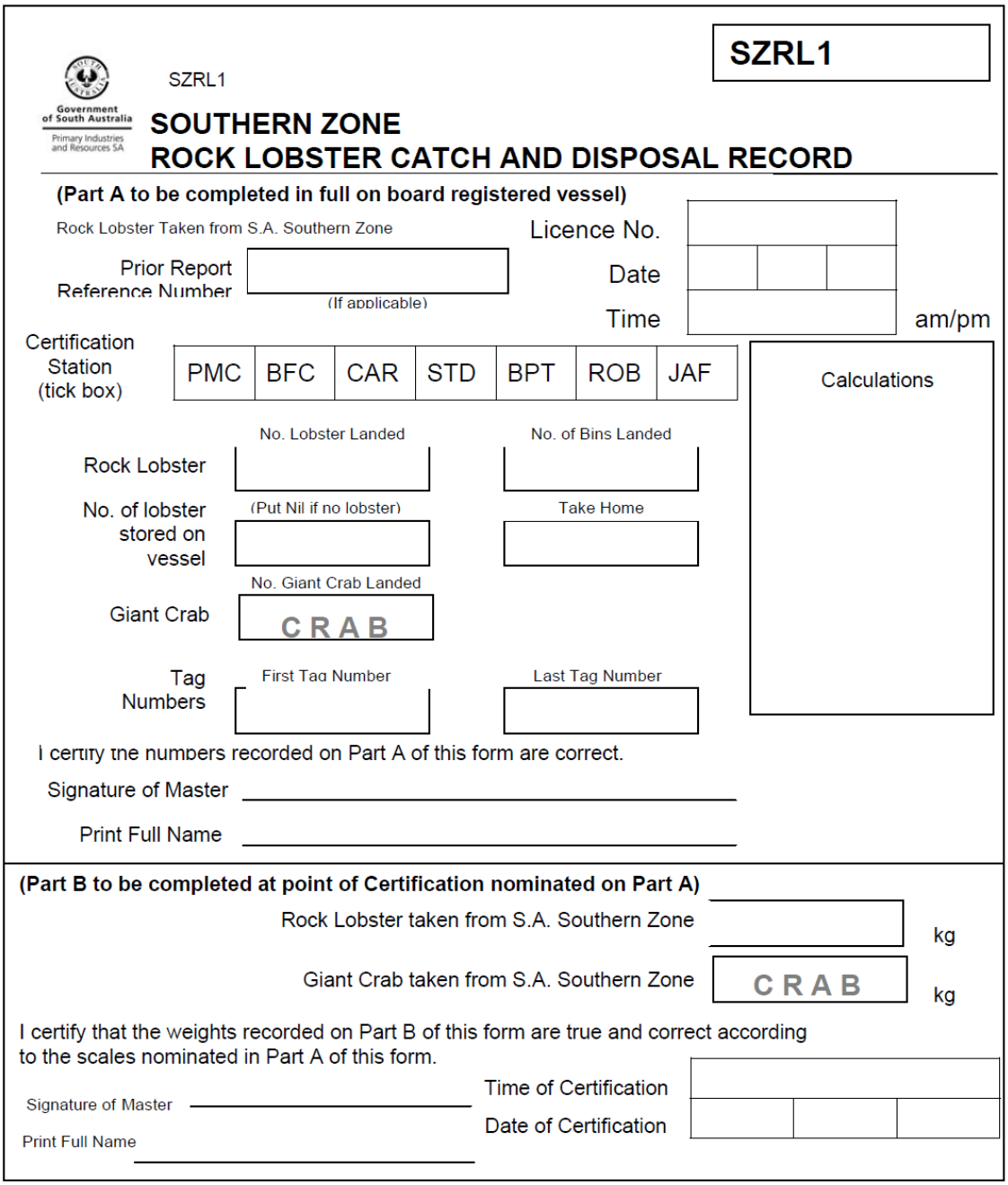
N/A

Wishlist

N/A

Forms

See Attached Southern Zone Catch and Disposal Record form.



SZRL1

Government of South Australia
Primary Industries and Resources SA

SZRL1

SOUTHERN ZONE
ROCK LOBSTER CATCH AND DISPOSAL RECORD

(Part A to be completed in full on board registered vessel)

Rock Lobster Taken from S.A. Southern Zone

Licence No.

Prior Report Reference Number (If applicable)

Date

Time am/pm

Certification Station (tick box)

PMC	BFC	CAR	STD	BPT	ROB	JAF

Calculations

	No. Lobster Landed	No. of Bins Landed
Rock Lobster		
	(Put Nil if no lobster)	Take Home
No. of lobster stored on vessel		
	No. Giant Crab Landed	
Giant Crab	CRAB	
	First Tag Number	Last Tag Number
Tag Numbers		

I certify the numbers recorded on Part A of this form are correct.

Signature of Master

Print Full Name

(Part B to be completed at point of Certification nominated on Part A)

Rock Lobster taken from S.A. Southern Zone kg

Giant Crab taken from S.A. Southern Zone CRAB kg

I certify that the weights recorded on Part B of this form are true and correct according to the scales nominated in Part A of this form.

Signature of Master

Print Full Name

Time of Certification

Date of Certification

Figure 13.4: South Australia (Southern Zone) rock lobster catch and disposal record.

4.2 South Australian Quota Monitoring (Northern Zone)

General

This documents the quota monitoring process in the South Australian Northern Zone Rock Lobster fishery.

Workflow

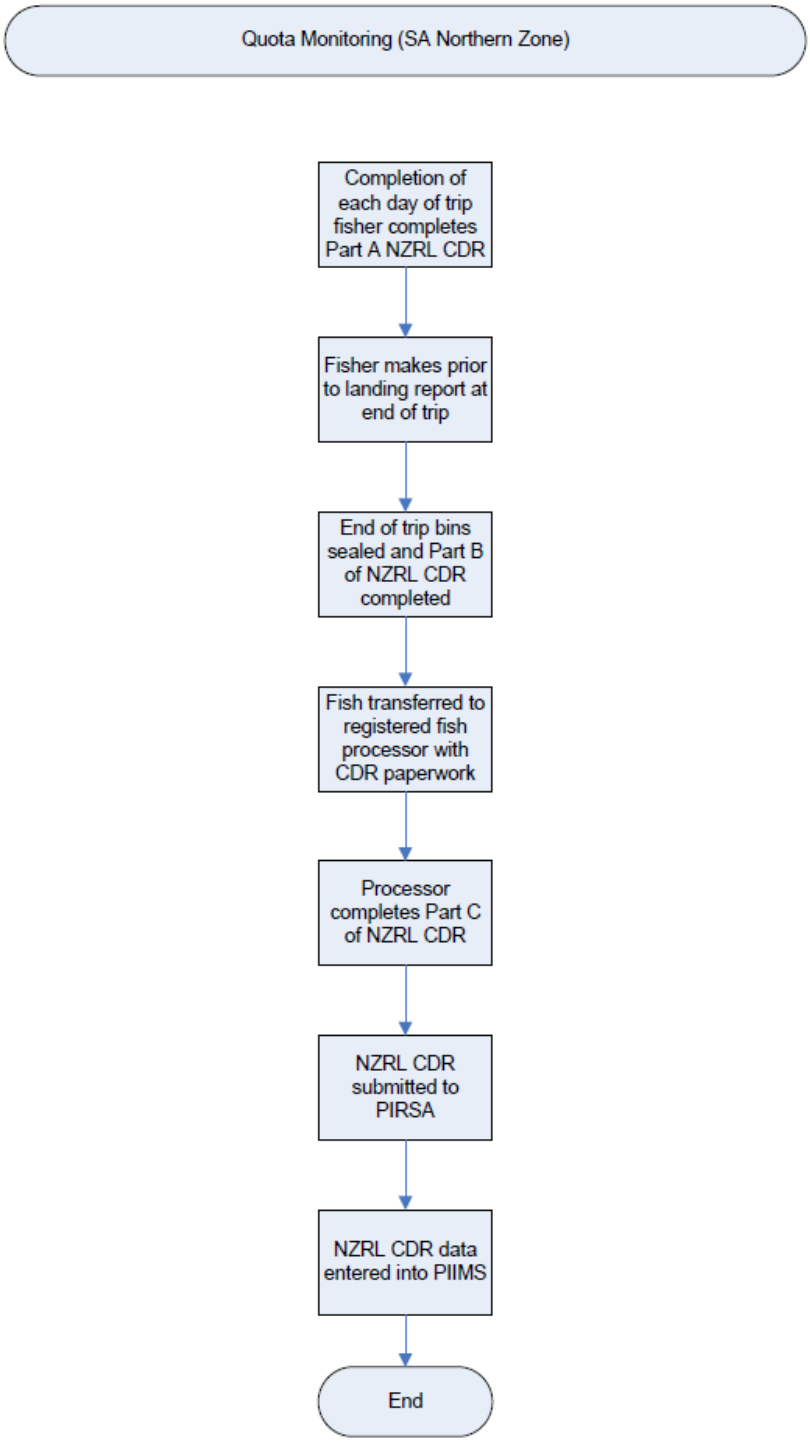


Figure 13.5: South Australia (Northern Zone) quota monitoring workflow.

Cost of Operation

South Australia operates a full cost recovery model for management of the Rock Lobster fishery estimated annually based on program requirements.

Technology Used

See attached form "Northern Zone Rock Lobster Catch and Disposal Record". This is a manual process until the completed form is entered into PIMS.

Data is stored in an Oracle database with an Oracle front end application

Variables Recorded

Form NZRL CDR (Catch & Disposal Record Part A – Daily Catch Log)

- Licence Number
- Date/Time *
- Number of rock lobster taken *
- Number of rock lobster into Corf *
- Number of rock lobster mortalities *

* Recorded for up to 10 days, may be carried over to a new form. Totals recorded at end of trip.

Form NZRL CDR (Catch & Disposal Record Part B – Disposal Record)

- Licence Number
- Prior report reference number
- Unloading Date/Time
- Port or location of unloading
- Rock lobster consigned to more than 1 processor (Y/N) + CDR numbers if Y
- Number of rock lobster consigned to processor
- Number of bins
- First/Last bin tag numbers
- Number of rock lobster taken home
- Number of giant crab
- Form completed date/time

Form NZRL CDR (Catch & Disposal Record Part C – Receival Record)

- Registered Fish Processor Name
- Registered Fish Processor premises address
- Processor number
- Receival Date/Time
- License Holder/Registered Master Name
- Number of bins
- First/Last bin tag numbers
- Accurate net weight of rock lobster (kg)
- Number of giant crab
- Weight of giant crab (kg)
- Form completed date/time

Form NZRL CDR (Office Use)

- Number Rock Lobster processed

Number Rock Lobster Mortalities
Number Rock Lobster Total
Rock Lobster processed weight (kg)
Rock Lobster mortality weight (kg)

Data Schema

See Figure 16.3.

Legislative Requirements

Details on relevant legislation pertaining to the South Australian Rock Lobster Fishery can be found at the following web sites:

- http://www.legislation.sa.gov.au/LZ/C/A/FISHERIES%20MANAGEMENT%20ACT%202007/CURRENT/2007.4.UN.PDF
- http://www.legislation.sa.gov.au/LZ/C/R/FISHERIES%20MANAGEMENT%20(GENERAL)%20REGULATIONS%202007.aspx
- http://www.legislation.sa.gov.au/LZ/C/R/FISHERIES%20MANAGEMENT%20(ROCK%20LOBSTER%20FISHERIES)%20REGULATIONS%202006.aspx

Planned Changes

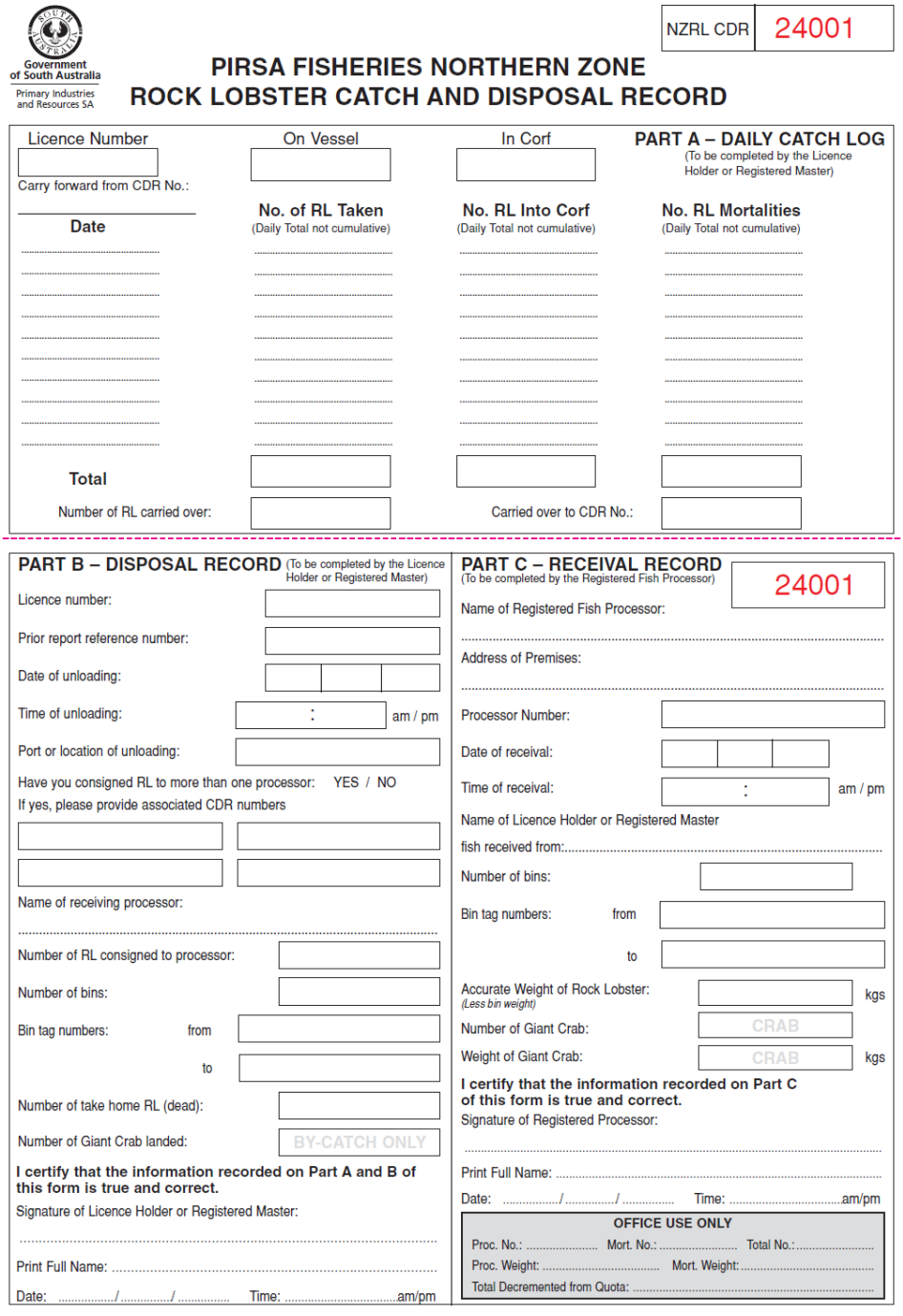
N/A

Wishlist

N/A

Forms

See Attached Northern Zone Catch and Disposal Record form.



Government of South Australia
Primary Industries and Resources SA

NZRL CDR 24001

PIRSA FISHERIES NORTHERN ZONE ROCK LOBSTER CATCH AND DISPOSAL RECORD

Licence Number | On Vessel | In Corf

Carry forward from CDR No.:

PART A – DAILY CATCH LOG
(To be completed by the Licence Holder or Registered Master)

Date	No. of RL Taken (Daily Total not cumulative)	No. RL Into Corf (Daily Total not cumulative)	No. RL Mortalities (Daily Total not cumulative)
Total			

Number of RL carried over:

Carried over to CDR No.:

PART B – DISPOSAL RECORD
(To be completed by the Licence Holder or Registered Master)

Licence number:

Prior report reference number:

Date of unloading:

Time of unloading: : am / pm

Port or location of unloading:

Have you consigned RL to more than one processor: YES / NO

If yes, please provide associated CDR numbers

Name of receiving processor:

Number of RL consigned to processor:

Number of bins:

Bin tag numbers: from

to

Number of take home RL (dead):

Number of Giant Crab landed: BY-CATCH ONLY

I certify that the information recorded on Part A and B of this form is true and correct.

Signature of Licence Holder or Registered Master:

Print Full Name:

Date: ...../...../..... Time: .....am/pm

PART C – RECEIVAL RECORD
(To be completed by the Registered Fish Processor)

24001

Name of Registered Fish Processor:

Address of Premises:

Processor Number:

Date of receival:

Time of receival: : am / pm

Name of Licence Holder or Registered Master

fish received from:

Number of bins:

Bin tag numbers: from

to

Accurate Weight of Rock Lobster: kgs
(Less bin weight)

Number of Giant Crab: CRAB

Weight of Giant Crab: CRAB kgs

I certify that the information recorded on Part C of this form is true and correct.

Signature of Registered Processor:

Print Full Name:

Date: ...../...../..... Time: .....am/pm

OFFICE USE ONLY

Proc. No.: ..... Mort. No.: ..... Total No.: .....

Proc. Weight: ..... Mort. Weight: .....

Total Decremented from Quota: .....

Figure 13.6: South Australia (Southern Zone) rock lobster catch and disposal record.

4.3 Victorian Quota Monitoring

General

Rock lobster (and giant crab) fishers are required to provide detailed daily catch information in a daily catch log. In addition, they must report their fishing activity for the day by mobile phone via an Interactive Voice Response (IVR) system. Rock lobster catches must be weighed and reported through the IVR system no more than 20 minutes after landing. The IVR system is the key tool used to track individual quota allocations. Data is stored on the Crustacean Quota Management System (CQMS). Details including the weight and number of rock lobster being landed, port of landing and time of landing are all recorded to assist in research, compliance and management matters. The IVR also enables fishers to check their quota balance; researchers and managers to monitor catches and catch rates real-time; and fisheries officers to target compliance operations.

Workflow

The IVR system is used to monitor the rock lobster, giant crab and abalone quotas. Lobster fishers call the IVR system from their vessel to report their times and places of departure and landing and the number of lobsters landed. Fisheries Officers can also interrogate the system to find out when and from which port a fisher is operating and how many lobsters are to be landed.

The initial sequence of the IVR system identifies the type of caller (Figure 16.7). The rock lobster and giant crab main menu then asks a series of questions and stores data entered by the fisher via the mobile phone keypad (Figure 2).

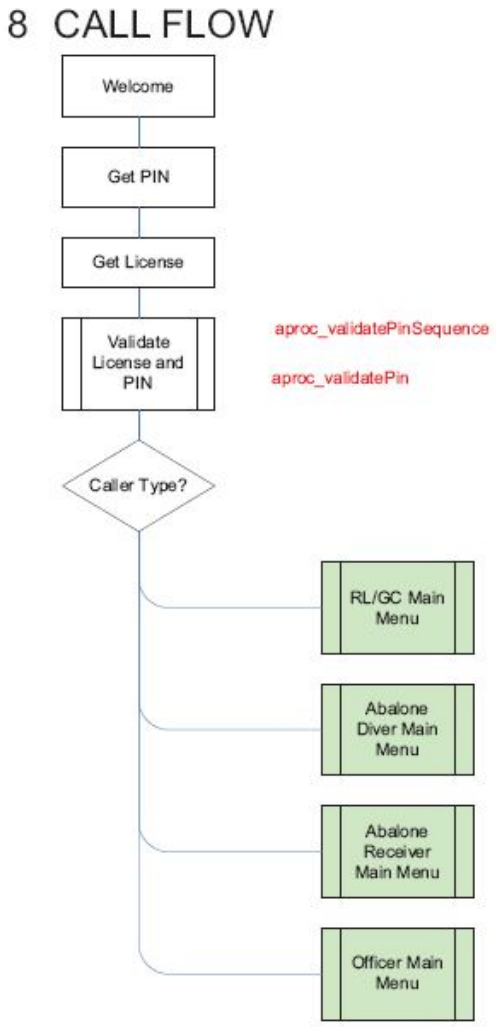


Figure 13.7: Victorian initial IVR call sequence.

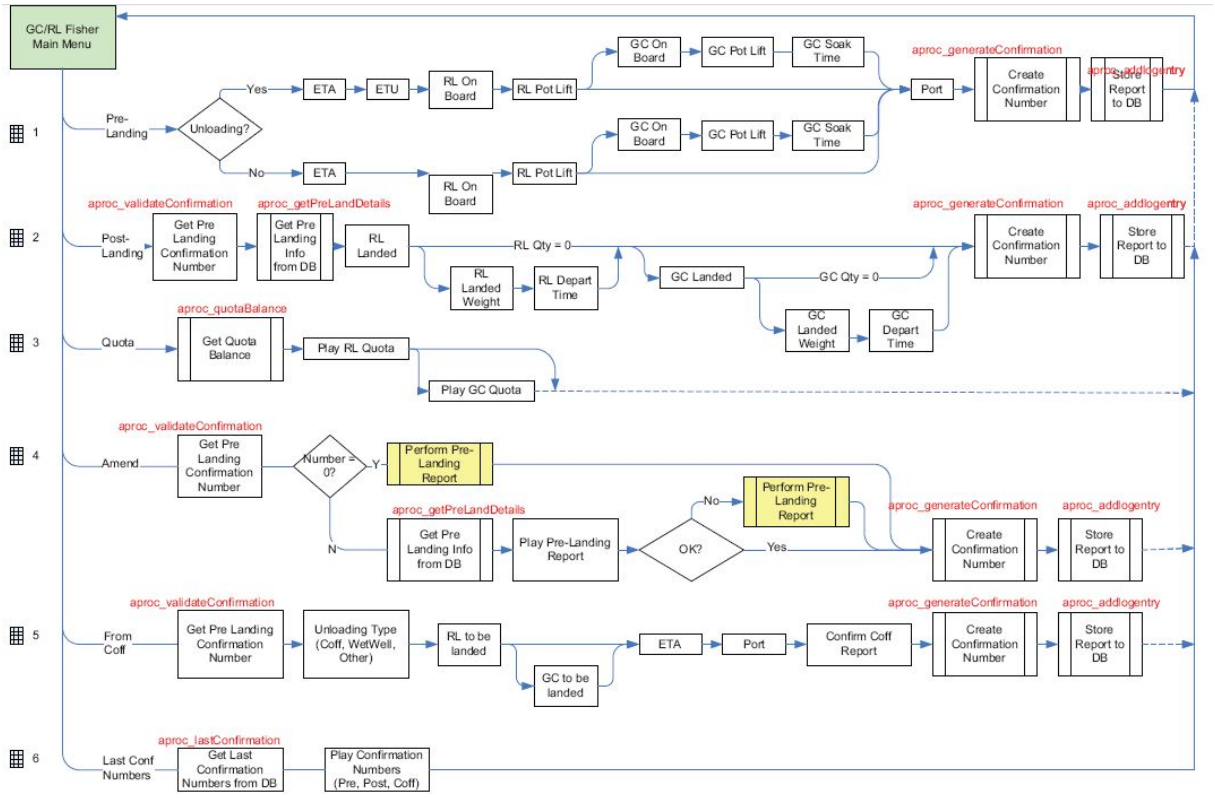


Figure 13.8: Victorian rock lobster and giant crab IVR workflow diagram.

Cost of Operation

The initial setup of the system was approximately $220,000. Annual maintenance cost is approximately $60,000 which includes the cost of running the giant crab, abalone and recreational licensing systems.

Technology Used

The IVR sits on a Sybase (version 12.5) RDBMS running on Unix with a PowerBuilder 9 desktop client and ColdFusion 5 web interfaces.

Variables Recorded

Trip Transaction_sequence
Pre_landing_confirmation_id
Post_landing_confirmation_id
Activity_transaction_type_id
Call_time
Landing_date
Landing_time
Unloading_time
Port_departure_time_rl
Port_departure_time_gc
Port_of_landing
Comments

Person	Licence_pin
	Licence_type
	Licence_sequence
	Holders_pfn
	Operators_pfn
	Licence_barcode
Pot	Pot_lift_rl
	Pot_lift_gc
	Soak_time_gc
Lobster	Catch_amount_species1
	Catch_weight_species1
	Catch_amount_species2
	Catch_weight_species2

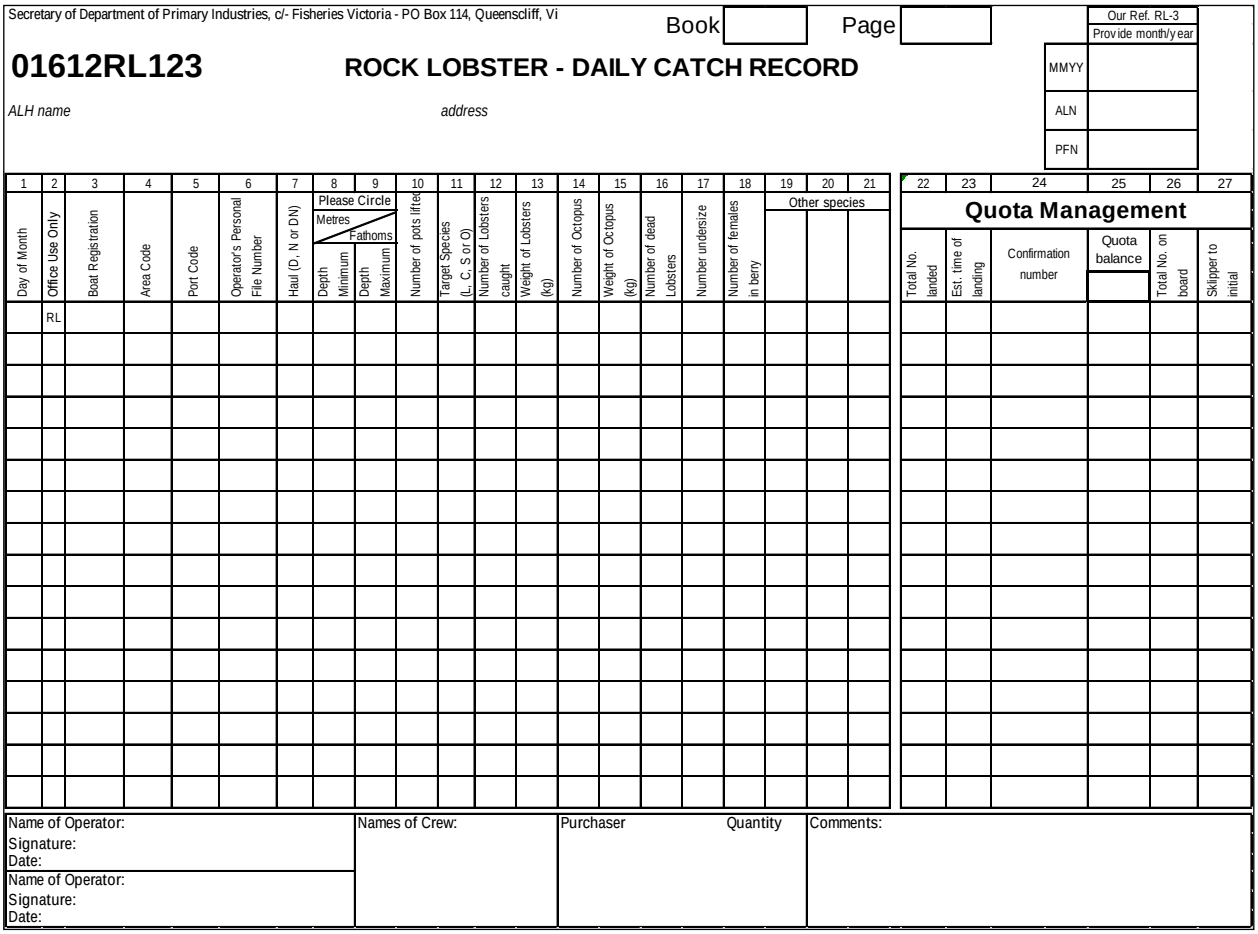
Data Schema
Not available.

Legislative Requirements
The *Fisheries Act 1995* requires that Access License Holders record Catch and Effort data on each day of commercial fishing.

Planned Changes
N/A.

Wish List
N/A.

Forms
See Attached.



Secretary of Department of Primary Industries, c/- Fisheries Victoria - PO Box 114, Queenscliff, Vi

Book Page

Our Ref. RL-3
Provide month/year

01612RL123 **ROCK LOBSTER - DAILY CATCH RECORD**

MMYY
ALN
PFN

ALH name *address*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Day of Month	Office Use Only	Boat Registration	Area Code	Port Code	Operator's Personal File Number	Haul (D, N or DN)	Please Circle Metres / Fathoms: Depth Minimum	Depth Maximum	Number of pots lifted	Target Species (L, C, S or O)	Number of Lobsters caught	Weight of Lobsters (kg)	Number of Octopus	Weight of Octopus (kg)	Number of dead Lobsters	Number undersize	Number of females in berry	Other species			Quota Management					
																					Total No. landed	Est. time of landing	Confirmation number	Quota balance	Total No. on board	Skipper to initial
	RL																									

Name of Operator: Signature: Date:	Names of Crew:	Purchaser Quantity	Comments:
Name of Operator: Signature: Date:			

Figure 13.9: Victorian daily catch record.

4.4 Tasmanian Quota Monitoring

General

This section documents quota monitoring data management in Tasmania. Quota monitoring is managed by the Department of Primary Industries, Parks, Water and Environment (DPIPWE) and data made available to TAFI researchers via a database download.

A telephone reporting system is used for compliance monitoring during processing and data validation as required, but is not used as a primary source of data collected. Quota Management System (QMS) forms processing requires two forms: part A (completed by the fisher) and part B (completed by the processor).

QMS is generally completed in quasi real time (with allowance for a lag of up to 7 days maximum for data entry).

Workflow

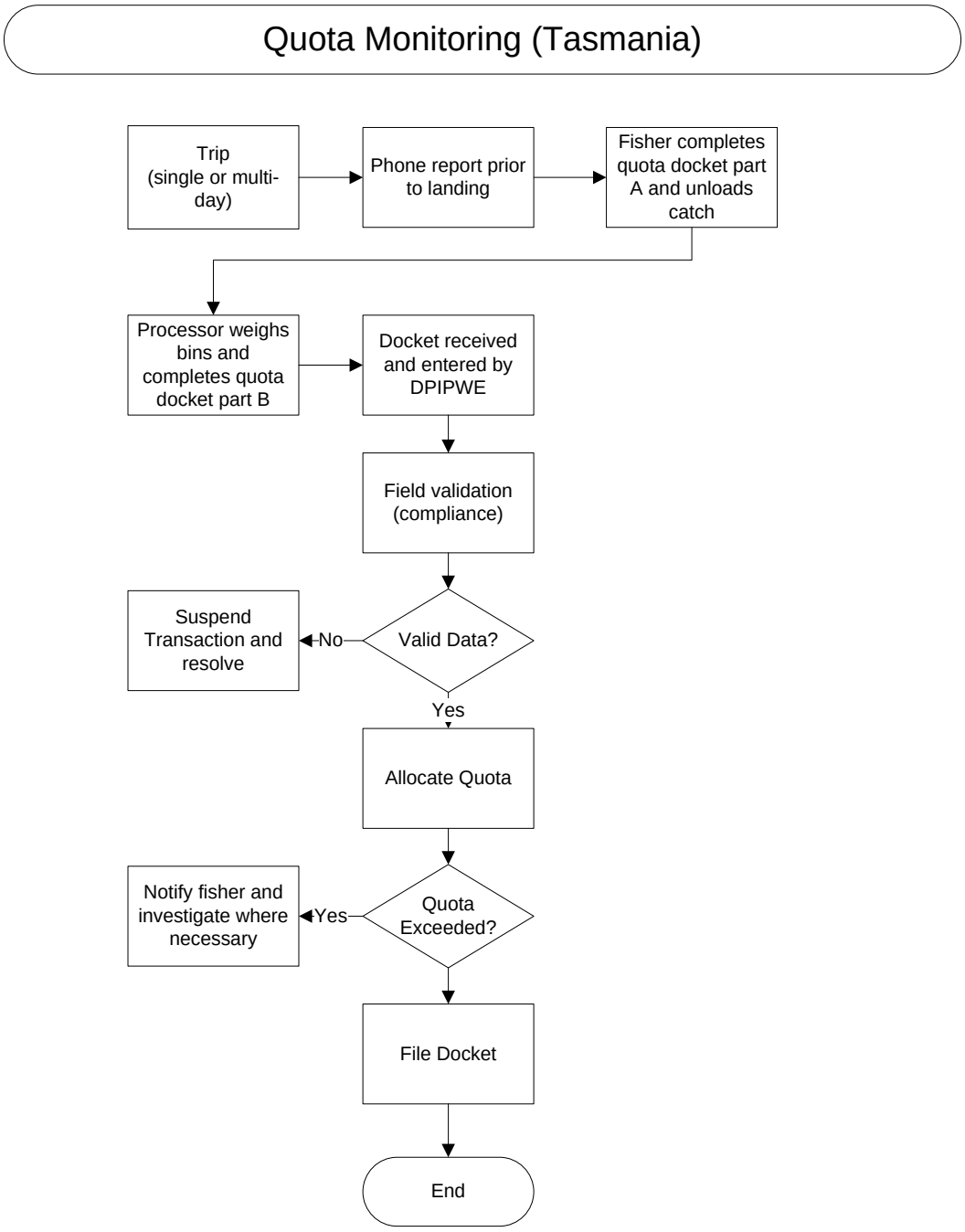


Figure 13.10: Quota monitoring workflow in Tasmania.

Cost of Operation

Comprehensive information for the cost of maintaining quota monitoring was unavailable. Broad estimates of human resources allocated to the function are 2.0 FTE for data entry and other administrative tasks and 0.1 FTE for IT support.

Technology Used

Quota monitoring is recorded by both fisher and processor using the commercial rock lobster quota docket which is submitted to DPIPWE where it is entered using a web application into an Oracle

database (version 9i). Parts of the database are replicated to the TAFI Oracle database (housed separately at the University of Tasmania) for analysis.

Variables Recorded

Part A (completed by the fisher)

- Entitlement Number
- Vessel distinguishing mark
- Vessel name
- Unloading Details
  - Date/time trip commenced
  - Date/time unloaded
  - Port where unloaded
  - Weight unloaded (kg)
  - Number unloaded
  - Processors name (consignee)
  - Unloading report receipt number
  - All unloaded (Y/N)
  - Number remaining on vessel
  - Number remaining in cauf
- Closed season/end of quota year details (only recorded if lobster are held during closed season or past end of quota year)
  - Weight held
  - Master docket number
  - Quota balance details

Part B (completed by the processor)

- Processors name
- Receipt date/time
- Placename where received
- Weight received
- Number of containers
- Container type and weight (kg)

Data Schema

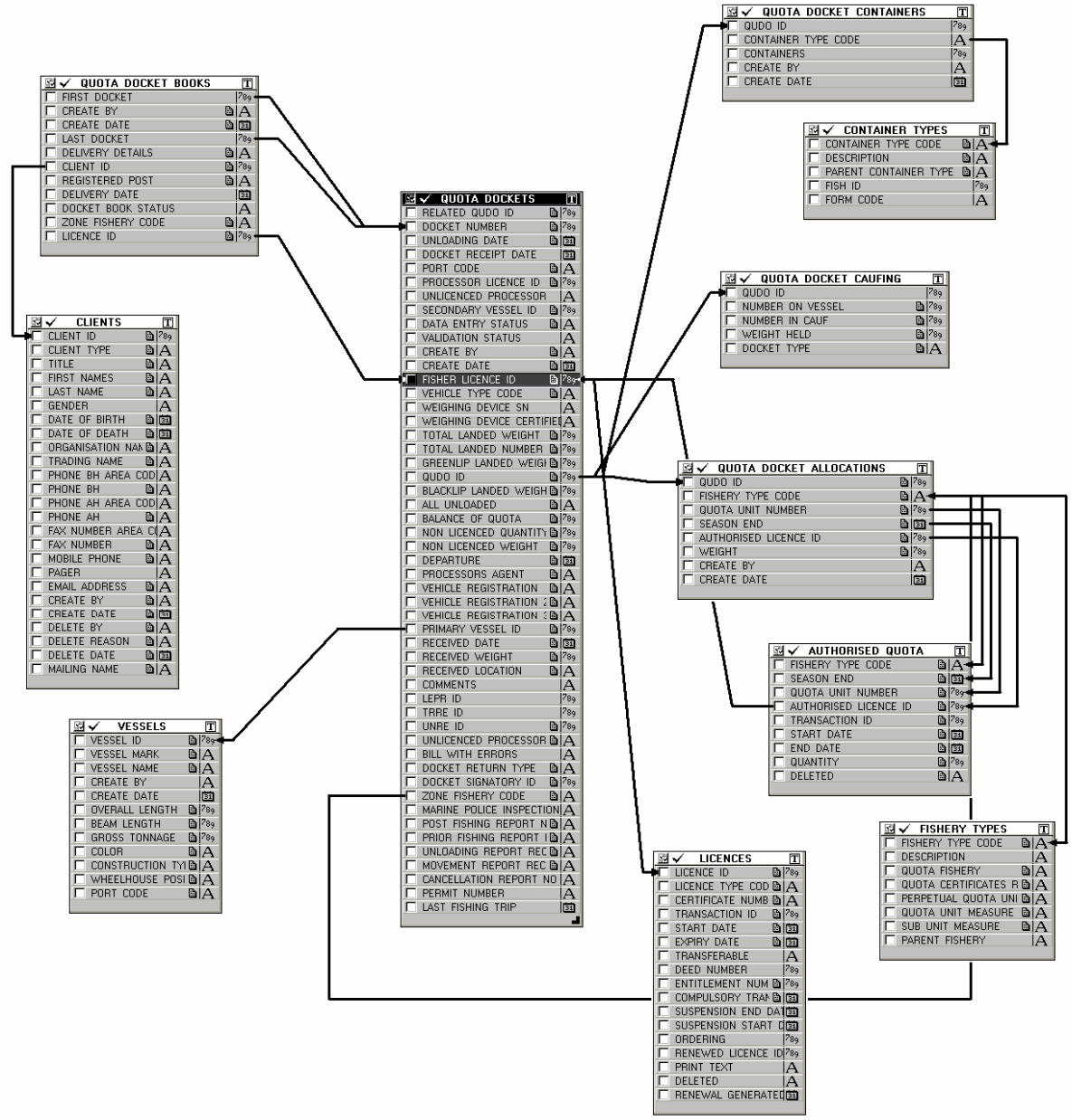


Figure 13.11: Quota monitoring database schema in Tasmania.

Legislative Requirements

Fishers are required to record their catch as part of quota management under section 145 of the Living Marine Resources Management Act 1995. The design and layout of the book are at the discretion of DPIPWE and approved by the Department Secretary. Details recorded relate directly to the management of the fishery, and are formulated by DPIPWE.

Planned Changes

Fisheries systems in Tasmania are currently being redeveloped. Lead times for the QMS development were not available.

Wish List

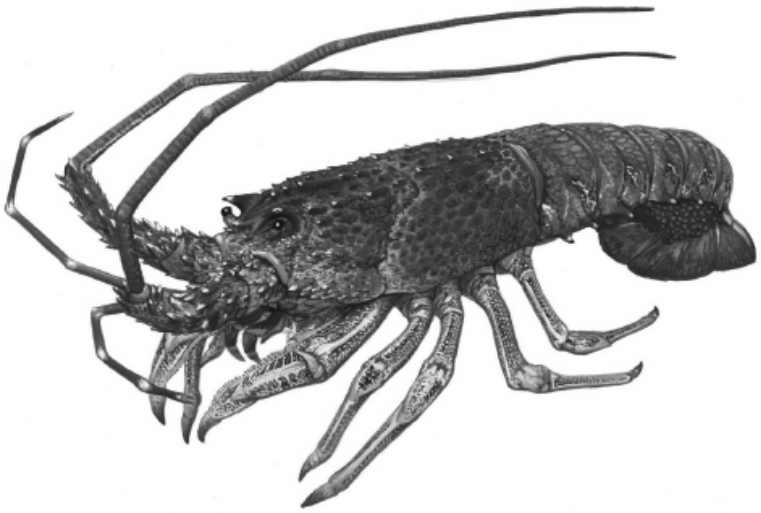
N/A.

Forms

F1570

Living Marine Resources Management Act 1995

Commercial Rock Lobster (RL) Quota Docket Book



Name of licence holder _____

Entitlement number _____

Please read the instructions carefully before completing these dockets

Department of Primary Industries and Water

Tasmania
Explore the possibilities

General information about this book

FI570

What is this book for?
This docket book must be used to record your rock lobster sold to holders of a fish processing/fish handling licence.

Why am I legally obliged to use this book?
This docket book and the instructions are forms approved by the Secretary of the Department of Primary Industries and Water (DPIW) for the keeping of records and other information for the purposes of section 145 of the *Living Marine Resources Management Act 1995* (LMRMA).
The Secretary requires that you keep records in the manner and form as detailed in this form.
It is an offence under section 263 of the LMRMA to provide false or misleading information or make a misleading omission on these dockets.
You may also be liable for prosecution for an offence under the LMRMA and the Rules made there under if you fail to complete this form, or do not complete the form accurately, or otherwise deal with the form contrary to the instructions or the relevant rules.

Definitions and expressions
Expressions used in this docket book have the same meaning as in the LMRMA unless the context implies a different meaning.

Who has to complete & sign the dockets?
The supervisor of the fishing licence (rock lobster) to which the entitlement number in Part A of the docket relates, is responsible for entering the required information into Part A of the docket book and signing the declaration for Part A.
The fish processor/fish handler or his/her agent to whom rock lobster are delivered, is responsible for completing Part B.
Fishers must not complete Part B and are not to sign Part B on behalf of the fish processor/fish handler or his/her agent.

What happens with my personal information?
Personal information will be collected from you for the purposes of sections 144 and 145 of the LMRMA and will be used by DPIW for the purposes permitted by this Act.
Your basic personal information may be disclosed to other public sector bodies where necessary or if required by law. Personal information will be managed in accordance with the *Personal Information Protection Act 2004* and may be accessed by the individual to whom it relates on request to DPIW. You may be charged for this service.

What is the fold out flap for?
You need to use the fold-out flap to prevent your docket book entries appearing on more than one set of pages. Place it under the white sheet when writing on a docket.

When must I start a new docket?
You must start a new docket whenever:
- you land rock lobster that is to be sold to a fish processor/fish handler; or
- you consign or deliver rock lobster to more than one fish processor/fish handler in a single landing; or
- you land rock lobster that are to be placed in your holding tank; or
- you hold rock lobster on a vessel during a closed season; or
- you hold rock lobster on a vessel or in a cauf at the end of a quota year.

What must I do with each docket and when do I have to do it?
- Forward the pink sheet to the Secretary within 48 hours of the time of receipt as recorded in Part B of the docket; and
- Make sure the yellow sheet accompanies the rock lobster when it goes with the fish processor/fish handler or agent; or
- Make sure the yellow sheet accompanies the rock lobster when it goes to your holding tank or when exported to a Tasmanian licensed fish processor/fish handler. *The receiver of the rock lobster must keep the yellow copy for at least five years;* and
- You must keep the white sheet for at least five (5) years.

No alterations are to be made to any entries made on any sheets of the dockets contained in this book.

What if I make a mistake(s) or an error(s)?
If a mistake is made on the docket, the docket must be cancelled and a new docket completed.

The pink and yellow sheets of any cancelled dockets must be returned to the Secretary of DPIW with the word "cancelled" written across them.

What if the docket book is damaged?
If your docket book is damaged to the extent that you cannot fill it in, then you should return the unused portion to the Secretary of DPIW. You will be issued with a replacement book.

What do I do if I lose this book?
You should notify the Licensing and Fisheries Monitoring Section of DPIW immediately if your docket book is lost. A replacement fee of $50 will be charged for a new book.

Where do I send completed dockets?
The return address for all dockets is:

Reply Paid 44
Dept of Primary Industries and Water
GPO Box 44
HOBART TAS 7001

Reply paid envelopes can be obtained from DPIW, if you need them.
Please note: if you choose not to use the DPIW reply paid envelopes you must provide your own stamp.

What if I need help or advice about the book?
Information about how to complete the dockets is provided overleaf.

If you have any problems, please telephone during office hours:
- 1300 368 550 (Toll free number within Tasmania) and ask for Licensing and Fisheries Monitoring Section.
- (03) 6233 3796
- (03) 6233 6536

What must the licence holder do if they leave the rock lobster industry?
You must return the quota docket book to DPIW and your completed white sheets will be returned to you.

It is an offence punishable by heavy penalties, not to strictly follow any or all of the instructions, directions and information set out in this book.

How to complete the Commercial Rock Lobster Quota Docket

FIS70

PART A must be completed before any rock lobster leave the site of unloading

PART A
Vessel details

Entitlement number
Write in your fishing licence (rock lobster) entitlement number.

Vessel
Write in the distinguishing mark and name of the vessel you used to catch the rock lobster.

Unloading details

Date that fishing trip commenced
Write in the date that you commenced the fishing trip before this unloading.

Time that fishing trip commenced
Write in the time, in 24 hour time format, that you commenced the fishing trip before this unloading. For example 5pm is written as 1700.

Date of unloading (In full)
Write in the date (in full) that you unloaded the rock lobster. For example, Tenth of January 1992.

Time of unloading
Write in the time you commenced unloading the rock lobster in 24 hour time format. For example 5pm is written as 1700.

Port
Write in the name of the port where the rock lobster were unloaded.

Weight of rock lobster unloaded
Write in the total wet weight, in kilograms, of the rock lobster unloaded.

No. of RL unloaded
Write in the number of rock lobster you unloaded. You should use the figures from your Rock Lobster Catch Record Book to complete this section.

Rock lobster consigned to
Write in the name of the fish processor/fish handler who you are selling or transferring your fish to.

If unloading into your holding tank then write in "holding tank".

Unloading report receipt no.
Write in the receipt number you were given when you made your unloading report.

Were all RL unloaded?
Tick the relevant box to show whether you unloaded all of your rock lobster.

Number of RL remaining on vessel
Write in the total number of rock lobster remaining on the vessel after this unloading.

Number of RL remaining in cauf
Write in the total number of rock lobster remaining in your cauf after unloading.

Closed season/end of quota year

This section is only required to be completed if rock lobster are being held during a closed season or at the end of the quota year.

Weight held
If you are holding rock lobster during the closed season, write the weight, in kilograms, held on the vessel in the box and tick the 'Closed season' box; or
If you are holding rock lobster at the end of the quota year write the total weight, in kilograms, held on the vessel and in your cauf in the box and tick the 'End of quota year' box then write in the quota year. For example, 2005/06.

Master docket no.
This is to be completed when you are unloading the rock lobster held during a closed season or at the end of the quota year.
Write the number of the docket where you declared the weight of the rock lobster held on the vessel during the closed season; or on the vessel and in your cauf at the end of the quota year.

Balance and quota details

Quota allocation details
For each quota entitlement fished write the quota entitlement number in the left box and the amount, in kilograms, of rock lobster that you want subtracted from that entitlement in the right box.

This total must add up to the 'Rock lobster on this docket' section in Box 4 of your "Balance details".

Balance Details

Uncaught quota after previous docket (Box 1)
Transfer the amount shown in the "Uncaught quota remaining" section on your previous docket to here. If this is your first docket for the quota year leave this section blank.

Added/removed since previous docket (Box 2)
If you have transferred some quota to or from your entitlement since you completed the previous quota docket then add or subtract it here.

Note: you must only add quota here if you have received confirmation from the DPIW that the quota has been added to your entitlement. You must not fish quota added to your entitlement if you have not received confirmation.

Direct sales (Box 3)
If you have sold or transferred rock lobster to an unlicensed receiver since you completed the previous docket, write the total weight, in kilograms, here as a negative number, for example, -2.

Leave boxes 2 and 3 blank if no quota has been added or removed since your last quota docket or if no direct sales have been made.

Rock lobster on this docket (Box 4)
Write the weight of rock lobster unloaded, in kilograms, as recorded in the unloading details.

Uncaught quota remaining (Box 5)
Calculate the amount of quota you have remaining by adding the amounts shown in boxes 1 and 2 and subtracting the amounts shown in box 3 and 4. Write the total in box 5.

Declaration

Read the declaration at the bottom of Part A. Print your name and sign and date the declaration.

Instructions for fish processors/fish handlers on how to complete Part B of the Commercial Rock lobster Quota Docket are on the fold-out flap.

F1570

Instructions for fish processors/fish handlers on how to complete Part B of the Commercial Rock Lobster Quota Docket

Note: Unless otherwise approved, a person who lands rock lobster (licence supervisor) must not complete Part B and cannot sign the Declaration in this section on behalf of a fish processor/fish handler.

PART B of the docket is only to be completed by the fish processor/fish handler or their agent.

1. **Name of fish processor/fish handler**
   Write in the name of the fish processor/fish handler receiving the rock lobster.

2. **Date of receipt**
   Write in the date that you received the rock lobster on this docket.

3. **Place of receipt**
   Write in the name of the place that you received the rock lobster.

4. **Time of receipt**
   Write in the time that you received the rock lobster. You must specify the time in 24 hour time format. For example 5pm would be written as 1700.

5. **Weight received**
   Write in the wet weight of the rock lobster that you received. Round down the total received weight of rock lobster to the nearest whole kilogram.

   Note: It is your responsibility to make sure you have correctly calculated the total weight. The weight recorded is the weight you are responsible for.

6. **No. of containers**
   Write in the number of containers that you are using to transport the rock lobster.

7. **Container type and weight**
   Write in the type and weight of the container in kilograms. For example, nally bins 3.2 or fish bin 3.5.

8. **Declaration**
   Read the declaration at the bottom of Part B, print your name and sign and date the declaration.

It is an offence punishable by heavy penalties not to strictly follow any and all of the instructions, directions and information set out in this book.

Commercial Rock Lobster Quota (RL)
Docket re-ordering form

FIS70

Please forward a Commercial Rock Lobster (RL) Quota Docket Book.

Name of Fisher _____

Entitlement Number _____

Address _____

Do you require replay-paid envelopes? Yes ☐ No ☐

Please mail this form to the address below, or fax to (03) 6233 3198

Reply Paid 44
Department of Primary Industries and Water
GPO Box 44
Hobart Tas 7001

OFFICE USE ONLY

Rock Lobster quota docket book sent by _____ ____/ ____/ ____

COMMERCIAL ROCK LOBSTER (RL) QUOTA DOCKET

F 1570

Docket no.

Department of Primary Industries and Water
Living Marine Resources Management Act 1995

PART A – TO BE COMPLETED BY THE FISHER

Vessel details

Entitlement number: | Vessel: | Dist mark | Vessel name

Unloading details

Date that fishing trip commenced: | Time that fishing trip commenced:

Date of unloading (in full):

Time of unloading: | Port:

Weight of rock lobster unloaded: kg | No. of RL unloaded:

Rock lobster consigned to:

Unloading report receipt no.: | Were all RL unloaded? Yes ☐ No ☐

Closed season/end of quota year

Weight held: kg

Number of RL remaining on vessel:

Number of RL remaining in cauf:

Closed season ☐ End of quota year ☐ Quota year | Master docket no

Balance and quota details

Quota allocation details

Quota ent. no.	Weight	Balance details		
	kg		kg	1. Uncaught quota after previous docket
	kg	+/-	kg	2. Added/removed since previous docket
	kg	-	kg	3. Direct sales
	kg	-	kg	4. Rock lobster on this docket
	kg	=	kg	5. Uncaught quota remaining

Declaration

I declare that:

- I have landed the amount of rock lobster specified in Part A of this docket; and
- all details specified in Part A were recorded by me and are accurate and complete in every respect; and
- all rock lobster to which the information on this docket refers are no smaller than the minimum legal size and the females are not in berry; and
- all rock lobster were taken in State waters only from this vessel; and
- I have not made a false or misleading statement in this docket, nor have I omitted any information or details without which the statements in this docket are false or misleading.

Licence supervisor's name printed | Licence supervisor's signature | Date

PART B – TO BE COMPLETED BY THE FISH PROCESSOR/FISH HANDLER OR THEIR AGENT

Name of fish processor/fish handler:

Place of receipt:

Weight received: kg

Date of receipt:

Time of receipt:

No. of containers:

Container type and weight:

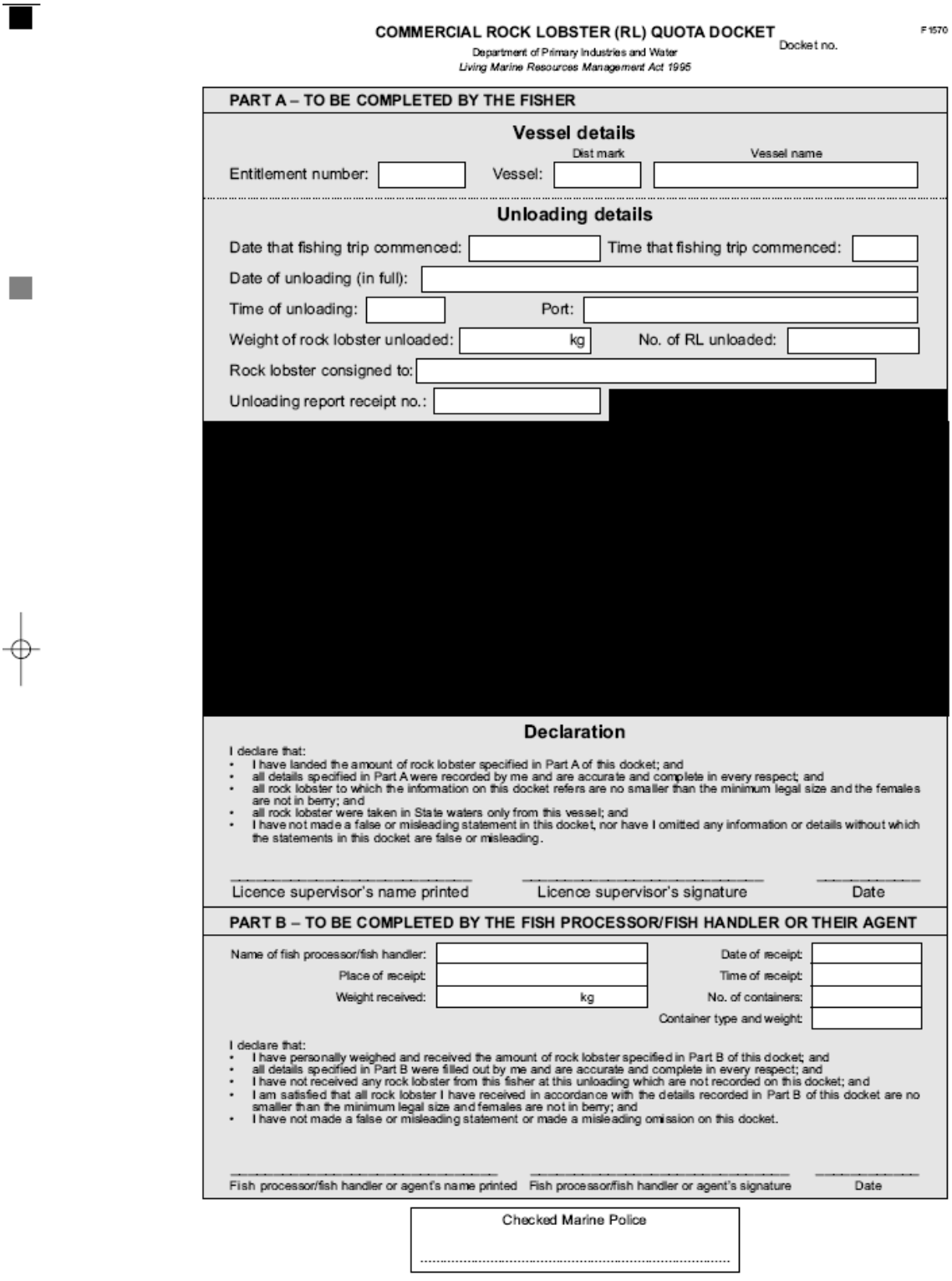
I declare that:

- I have personally weighed and received the amount of rock lobster specified in Part B of this docket; and
- all details specified in Part B were filled out by me and are accurate and complete in every respect; and
- I have not received any rock lobster from this fisher at this unloading which are not recorded on this docket; and
- I am satisfied that all rock lobster I have received in accordance with the details recorded in Part B of this docket are no smaller than the minimum legal size and females are not in berry; and
- I have not made a false or misleading statement or made a misleading omission on this docket.

Fish processor/fish handler or agent's name printed | Fish processor/fish handler or agent's signature | Date

Checked Marine Police

.....



COMMERCIAL ROCK LOBSTER (RL) QUOTA DOCKET

F 1570

Docket no.

Department of Primary Industries and Water

Living Marine Resources Management Act 1995

PART A – TO BE COMPLETED BY THE FISHER

Vessel details

Entitlement number: Vessel: Dist mark Vessel name

Unloading details

Date that fishing trip commenced: Time that fishing trip commenced:

Date of unloading (in full):

Time of unloading: Port:

Weight of rock lobster unloaded: kg No. of RL unloaded:

Rock lobster consigned to:

Unloading report receipt no.:

[redacted]

Declaration

I declare that:

- I have landed the amount of rock lobster specified in Part A of this docket; and
- all details specified in Part A were recorded by me and are accurate and complete in every respect; and
- all rock lobster to which the information on this docket refers are no smaller than the minimum legal size and the females are not in berry; and
- all rock lobster were taken in State waters only from this vessel; and
- I have not made a false or misleading statement in this docket, nor have I omitted any information or details without which the statements in this docket are false or misleading.

Licence supervisor's name printed Licence supervisor's signature Date

PART B – TO BE COMPLETED BY THE FISH PROCESSOR/FISH HANDLER OR THEIR AGENT

Name of fish processor/fish handler: Date of receipt:

Place of receipt: Time of receipt:

Weight received: kg No. of containers:

Container type and weight:

I declare that:

- I have personally weighed and received the amount of rock lobster specified in Part B of this docket; and
- all details specified in Part B were filled out by me and are accurate and complete in every respect; and
- I have not received any rock lobster from this fisher at this unloading which are not recorded on this docket; and
- I am satisfied that all rock lobster I have received in accordance with the details recorded in Part B of this docket are no smaller than the minimum legal size and females are not in berry; and
- I have not made a false or misleading statement or made a misleading omission on this docket.

Fish processor/fish handler or agent's name printed Fish processor/fish handler or agent's signature Date

Checked Marine Police

.....

Figure 13.12: Tasmanian rock lobster quota docket

4.5 South Australian Catch & Effort Logbook

General

This documents the catch and effort logbook data management in South Australia and incorporates Byproduct record keeping. The catch and effort logbook in South Australia is managed by the South Australian Research and Development Institute (SARDI). Log book systems are identical for northern and southern fishing zones.

Threatened, Endangered and Protected Species (TEPS) interactions are recorded in South Australia as part of a specific monitoring program. An example of a TEPS monitoring from is provided.

Workflow

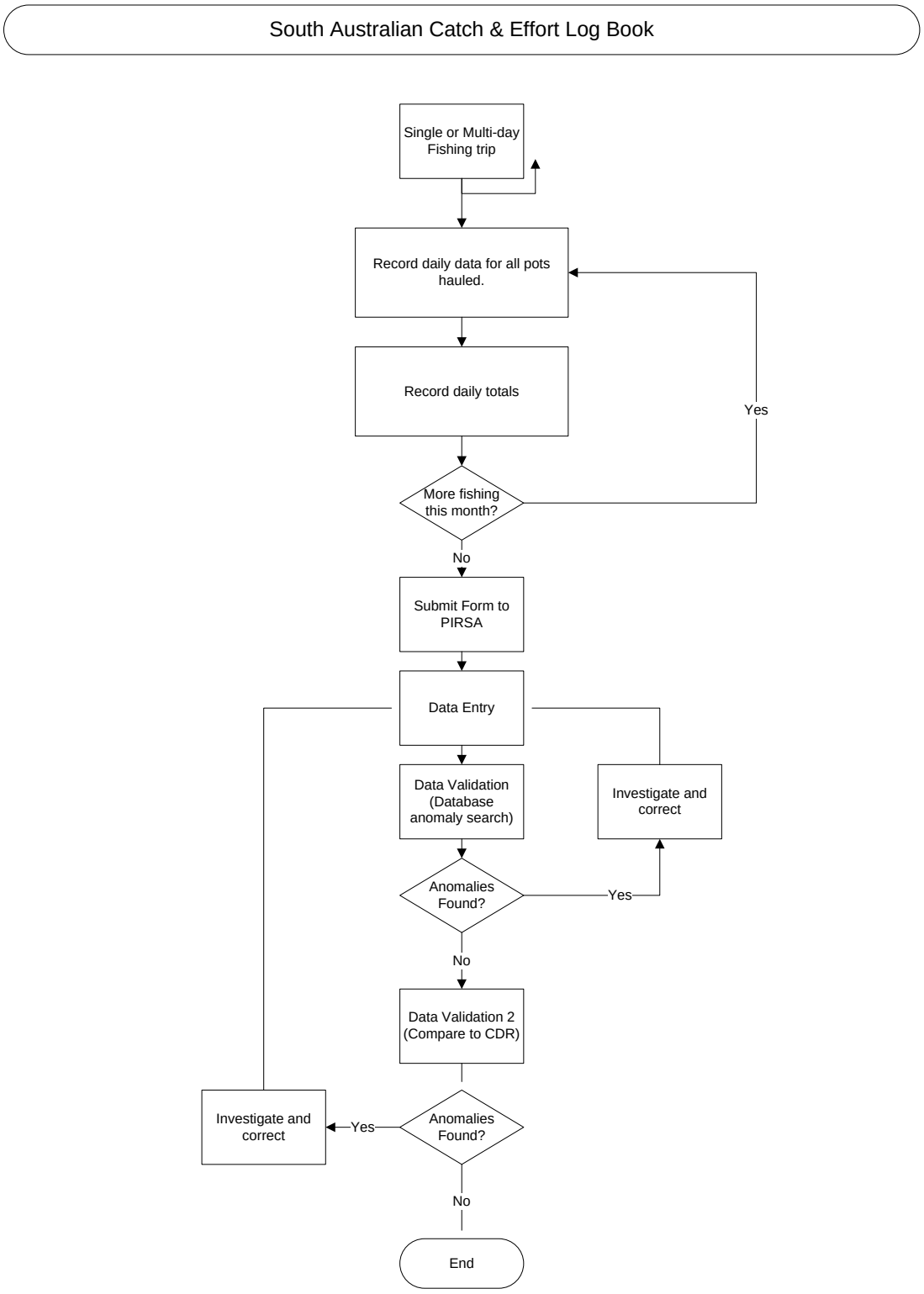


Figure 13.13: South Australia catch and effort logbook workflow.

Cost of Operation

South Australia operates a full cost recovery model for management of the Rock Lobster fishery estimated annually based on program requirements. The program currently employs 4.5 FTE's.

Technology Used

Data is collected manually using mandatory commercial log books and entered into the South Australian rock lobster database (SARL) (Oracle front end application and database). Data are extracted through SQL query system.

Variables Recorded

Monthly

- License number
- License holder
- Ports of landing used during the month

Each day

- Date
- Marine Fishing Area (MFA)
- Depth
- Number of potlifts
- Weight caught (legal size only, kg)
- Undersize count (voluntary)
- Spawning count (voluntary)
- Mortality count (voluntary)
- Weight returned (legal size only, kg, voluntary)
- Bycatch (voluntary, number and/or weight)
- Byproduct (Giant crab/Octopus, number and weight)

Data Schema

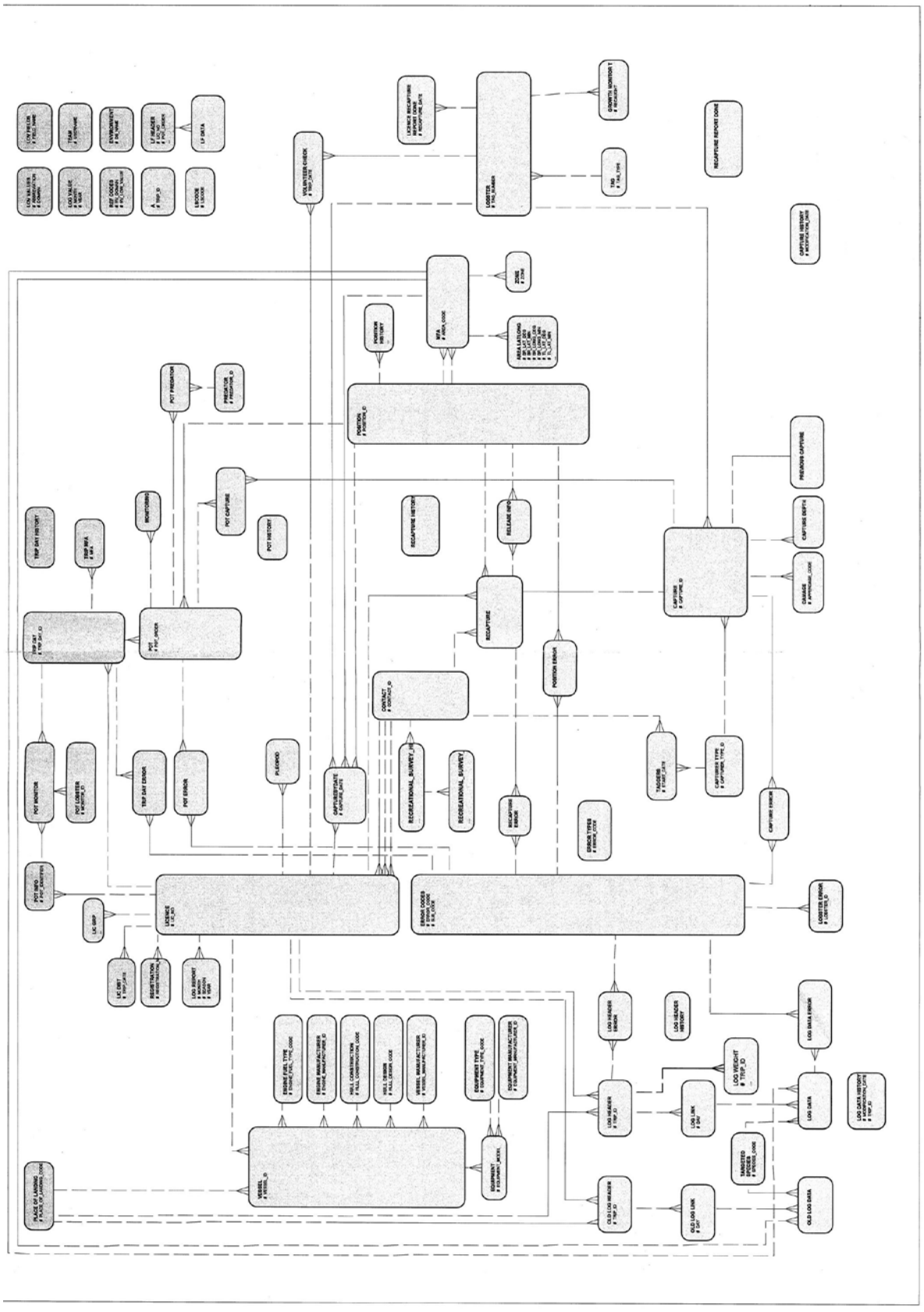


Figure 13.14: South Australia database schema.

Legislative Requirements

The Fisheries Management Act 2007 (SA) requires fishers to maintain a daily logbook of fishing activity.

Planned Changes

N/A

Wish List

N/A

Forms

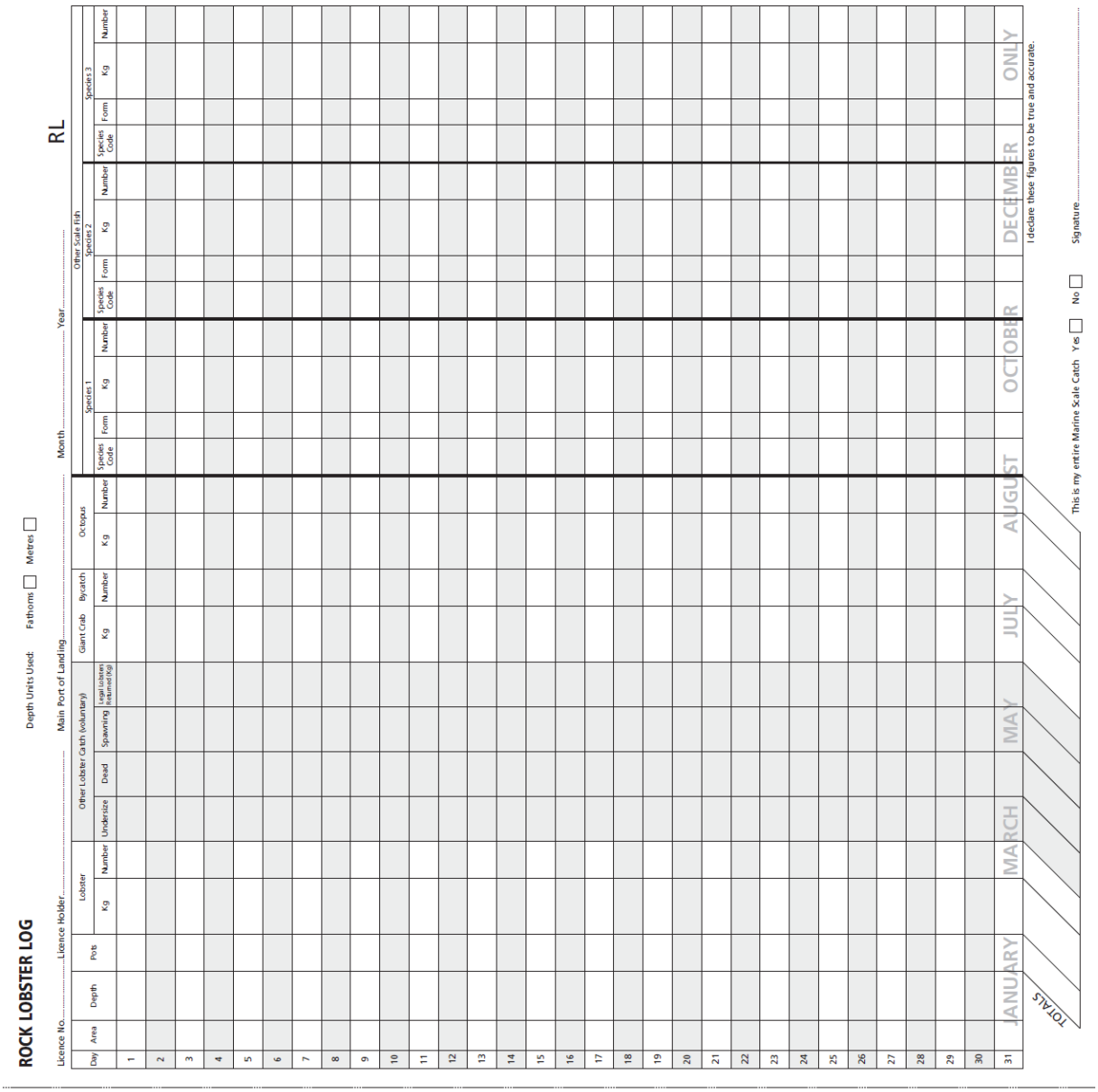


Figure 13.15: South Australia logbook form.

Government of South Australia
Primary Industries and Resources SA

SA MANAGED FISHERIES WILDLIFE INTERACTION FORM

Managed Fishery | **Date of Interaction** | **Observer On Board** ☐ YES ☐ NO (Tick Yes or No)

Licence Number | **Corresponding Logbook No.** CB

GREAT WHITE SHARK, WHALE SHARK, SEABIRD, SEAL, DOLPHIN, WHALE, TURTLE, SEAHORSE

Species Name (be specific, one line for each individual, except sea horses)	Gear Code	No. of Sea Horses	Time at which Interaction occurred (24 hr)	Latitude & Longitude of Interaction: South (D M) East (D M)	Caught during operations (please tick 1 box only): Set / Fish / Haul / Other	Band or tag number	Life status (please tick 1 box only): Alive / Dead / Injured
			:				
			:				
			:				
			:				

Comments: Is there any other information you believe to be important? Where was the animal entangled (flipper, mouth, wing, tail etc)? Where in the gear was the animal entangled (pot, pot-rope, cod-end / net pocket, net wing, mainline of long/drop line, hook)? How was the animal released (lowered by hand, lowered by net into water, cut out of net, line cut?

I certify this form to be complete and accurate: _____
(Signature of Licence Holder)

Figure 13.16: South Australia wildlife interaction form.

4.6 Victorian Catch & Effort Logbook

General

The Victorian Rock Lobster logbook is completed by fishers daily and must be kept up to date and available on the vessel for inspection by Fisheries Officers. The Catch and Effort Unit at Queenscliff processes data from logbooks submitted by all Victorian commercial fishers. Catches are recorded daily for each fishery and submitted to the Unit monthly.

Workflow

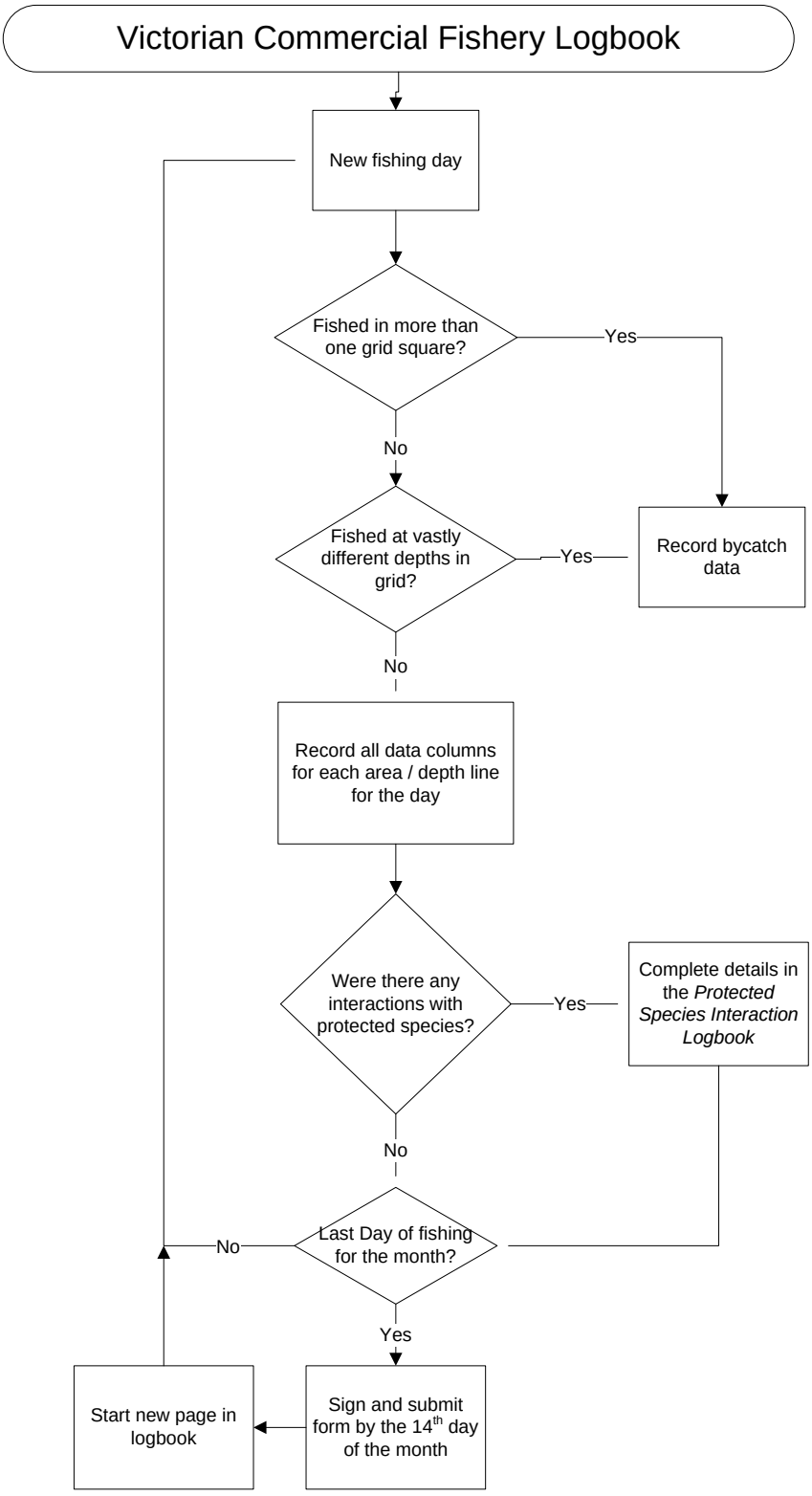


Figure 13.17: Victorian catch & effort logbook workflow.

Cost of Operation

The overall annual budget to run the logbook program is $370K of which the Rock lobster data component is a significant component, however a breakdown of costs by fishery is not available.

Technology Used

The Commercial Fisheries Catch and Effort system is a purpose-built system developed in a SIR Database to keypunch, validate and provide summaries of Victorian Commercial Fisheries data. The logbook returns are keypunched into Catch and Effort using a double entry system to reduce input errors. The Catch and Effort SIR database is linked to the Fisheries Integrated Licensing System (FILS) for fisher, vessel and license details. Although not currently directly linked to the SIR database, Unit staff use the Crustacean Quota Management System (CQMS) to provide information which is missing or unclear on the logbook return. Data on landed catch, time of landing etc is entered to CQMS by fishers using an Interactive Voice Response system via mobile phones.

The Catch and Effort system is written in SIR2000 (Scientific Information Retrieval, Version 2000), running on a UNIX server. It is accessed via X-windows software called Exceed (Version 10), running on desktop PCs. SIR2000 is a relational database management system with a powerful scripting language enabling the coding of complex data handling algorithms. FILS sits on a Sybase (version 12.5) RDBMS running on Unix with a PowerBuilder 9 desktop client and ColdFusion 5 web interfaces.

Variables Recorded

Trip	Year
	Month
	Access Licence Number (ALN)
	ALN Holder's Personal File Number
	Day of Month
	Return type (RL)
	Boat registration
	Area code
	Operator PFN
	Haul (D,N or DN)
	Depth minimum (Fathoms/Metres)
	Depth maximum (Fathoms/Metres)
Pot	Number of pots lifted
	Days between setting and hauling pots
Lobster	Target species – Lobster, Giant Crab or Other (L,C or O)
	Number of lobsters caught
	Weight of lobsters (kg)
	Number of dead lobsters
	Number of undersize
	Number of females in berry
By-catch	Number of Giant Crab caught
	Weight of Giant crab (1978-2001 as above)
	Number of Octopus
	Weight of Octopus
	Other species.

	Other species (as above)
	Other species (as above)
Other	Name of Crew
	Purchaser 1 of month's catch
	Quantity purchased by 1 during the month
	Purchaser 2 of month's catch
	Quantity purchased by 2 during the month
	Port of landing code

Data Schema

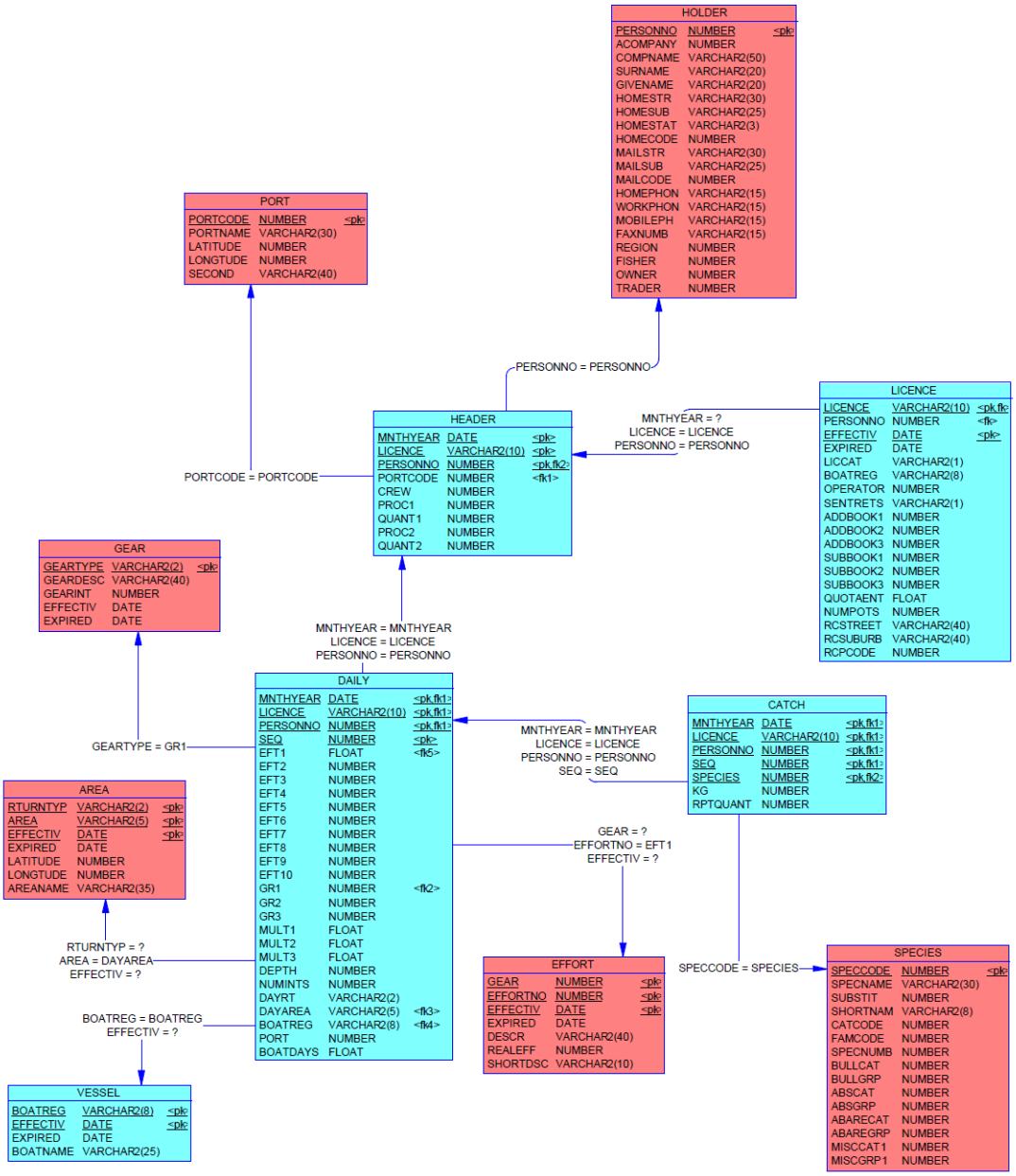


Figure 13.18: Victorian catch & effort database schema

Legislative Requirements

The *Fisheries Act 1995* requires that Access License Holders record Catch and Effort data on each day of commercial fishing.

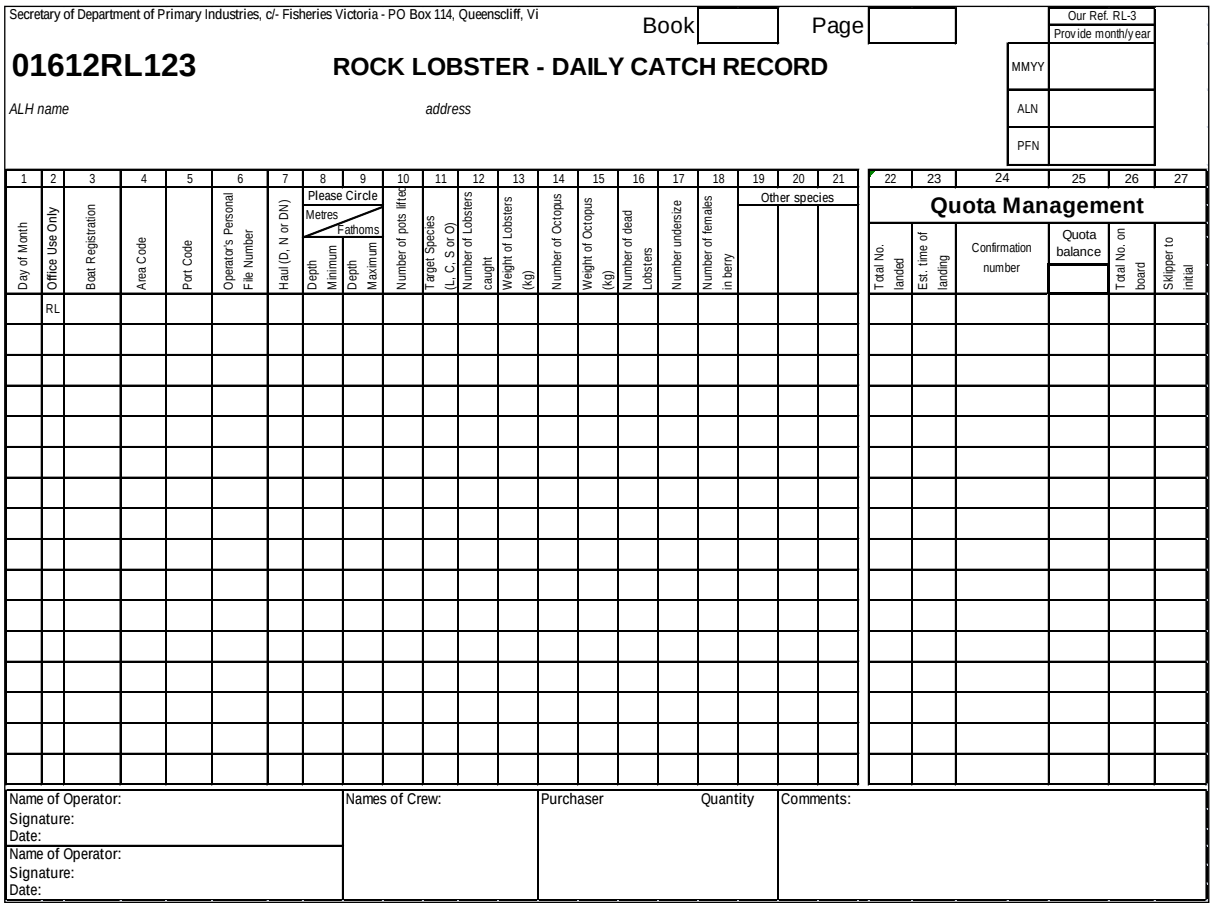
Planned Changes

The Catch and Effort Database is currently being redeveloped and is due to be operational during 2010/11. The new SQL system will include ability for online data entry by Access Licence Holders, integration with the FILS and CQMS systems and improved access to data requests by Fisheries Officers and the public.

Wish List

N/A

Forms



Secretary of Department of Primary Industries, c/- Fisheries Victoria - PO Box 114, Queenscliff, Vi

Book ____ Page ____ Our Ref. RL-3 Provide month/year

01612RL123 **ROCK LOBSTER - DAILY CATCH RECORD**

MMYY ____ ALN ____ PFN ____

ALH name *address*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Day of Month	Office Use Only	Boat Registration	Area Code	Port Code	Operator's Personal File Number	Haul (D, N or DN)	Please Circle Metres / Fathoms Depth Minimum	Depth Maximum	Number of pots lifted	Target Species (L, C, S or O)	Number of Lobsters caught	Weight of Lobsters (kg)	Number of Octopus	Weight of Octopus (kg)	Number of dead Lobsters	Number undersize	Number of females in berry	Other species			Quota Management					
	RL																				Total No. landed	Est. time of landing	Confirmation number	Quota balance	Total No. on board	Skipper to initial

Name of Operator: Signature: Date:	Names of Crew:	Purchaser Quantity	Comments:
Name of Operator: Signature: Date:			

Figure 13.19: Victorian catch & effort daily catch record.

4.7 Tasmanian Catch & Effort Logbook

General

This documents the catch and effort logbook data management in Tasmania and incorporates Byproduct and Endangered/Threatened species record keeping. The catch and effort logbook in Tasmania is managed by the Department of Primary Industries, Parks, Water and Environment (DPIPWE) and data made available to TAFI researchers via a database download.

Data is recorded in the log book daily. Byproduct is reported for up to four species per day and protected species interaction for one species per day (although fishers can submit further species via a separate form).

Redevelopment of the existing on-line system is scheduled to begin in March 2011.

Workflow

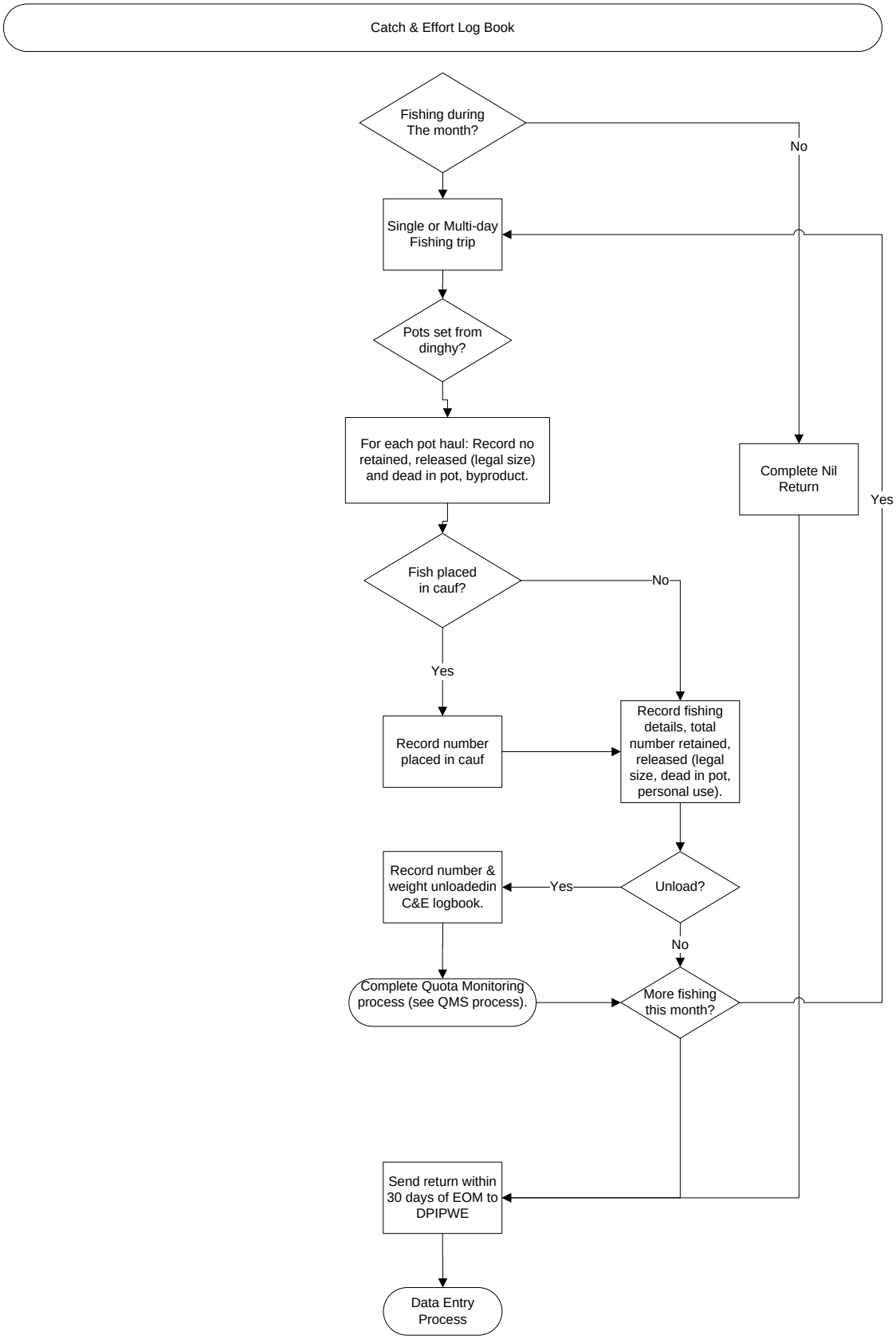


Figure 13.20: Tasmanian catch & effort logbook workflow.

Cost of Operation

The full cost of maintaining the catch and effort logbook was not available. DPIPWE currently allocate around 1 FTE for management and data entry, 0.1 FTE for IT effort and spend around $5000 per annum producing the log books (all figures are broad estimations made by DPIPWE staff and not based on actual data).

Technology Used

The Tasmanian catch and effort logbook is recorded on paper and submitted to DPIPWE where it is entered using a java based web application into an Oracle database (version 9i). The database shares information, and interacts, with other fisheries systems including licensing and quota management. Parts of the database are replicated to the TAFI Oracle database (housed separately at the University of Tasmania) for analysis.

Variables Recorded

Fisher information

- Vessel name
- Distinguishing mark
- Crew (number)
- Supervisors name
- Pots used (number)
- Phone number
- Mobile number

Fishing Details (recorded daily)

- Date
- Trip Type (Single or Multiday)
- Fishing Block
- Latitude/Longitude (GDA94 Datum)
- Weight unloaded (kg)
- Type of unload (Full/Partial)
- Shot type (Night/Day)
- Set depth (fathoms/metres)
- Number of potlifts

Details of rock lobster numbers (recorded daily)

- Dead in pot (numbers)
- Legal size discards (numbers)
- Kept (numbers)
- Personal use (numbers)
- Placed in fish cauf (numbers)
- Unloaded from vessel (numbers)
- Number on vessel at start of trip

Byproduct retained (up to four species per day)

Species
Estimated whole weight (kg)
Used as bait (Y/N)

Protected species interaction (one species per day)

Species code (Seal/Dolphin/Whale/Seabird/Albatross/Other)
Number
Interaction code (Damage to fishing gear/Tangled or fouled in gear, released alive/Tangled or fouled in gear, released dead/Collision with vessel, alive/Collision with vessel, dead/Collision with vessel, injured/Other)

Data Schema

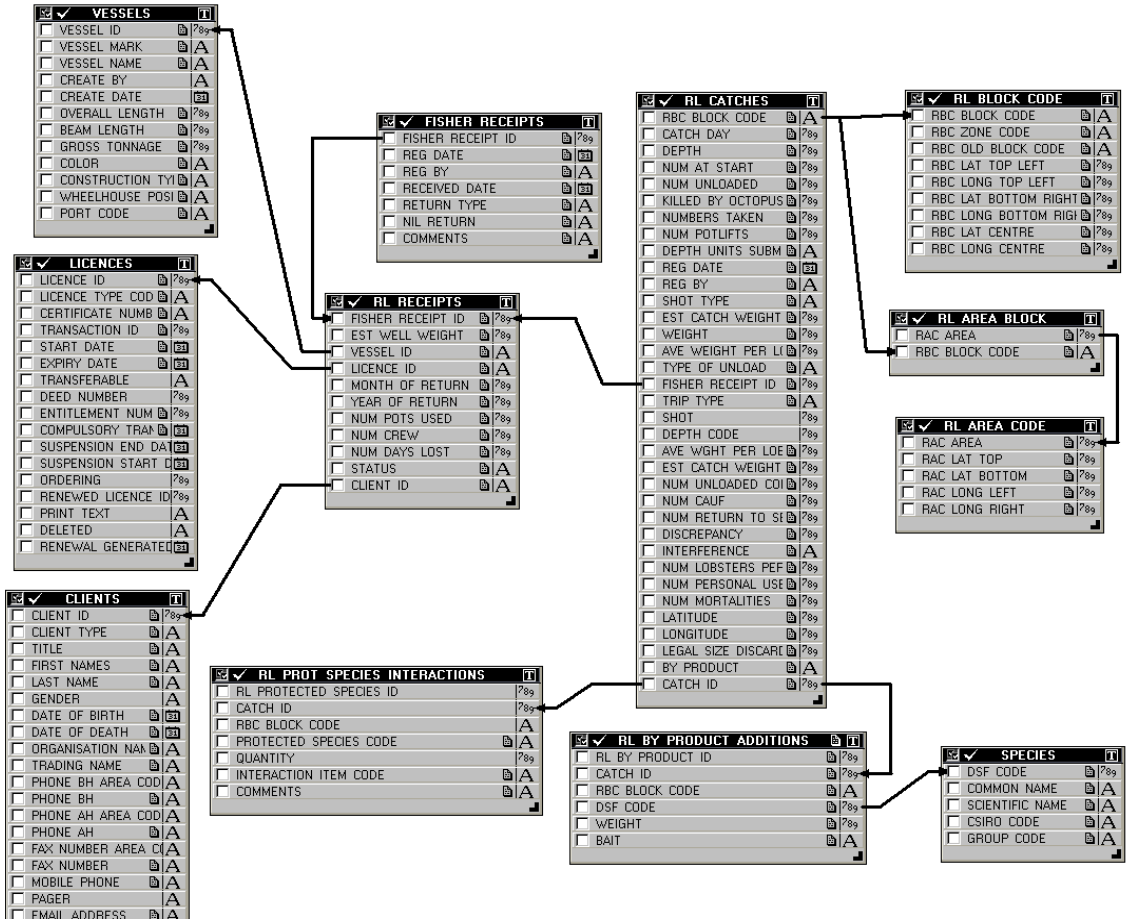


Figure 13.21: Tasmanian catch & effort database schema

Legislative Requirements

Fishers are required to maintain a logbook under section 145 of the Living Marine Resources Management Act 1995. The design and layout of the book are at the discretion of DPIPWE and approved by the Department Secretary. Generally, details recorded are agreed between stakeholders and driven by research or management needs. Completion of the log book is monitored by compliance officers.

Planned Changes

Fisheries systems in Tasmania are currently being redeveloped. Redevelopment of the existing on-line catch & effort logbook system is scheduled to begin in March 2011.

Wish List

- Currently unloaded weight cannot be accurately related to the catch area (or fishing block).
- Lacks integration with the licensing database (checks against the licensing database are currently performed manually).

Forms

F1422

Vessel name

.....

Distinguishing mark

.....

PLEASE READ INSTRUCTIONS CAREFULLY!

Rock Lobster

Catch Record Book

Living Marine Resources Management Act 1995

Department of Primary Industries and Water

Tasmania
Explore the possibilities

General information about the rock lobster catch record book

What is this book for?

The rock lobster catch record book must be used to record your:

- rock lobster catch and effort information
- any other fish retained that was caught in your rock lobster pot
- any physical interaction with a protected species

All fish caught when using any other fishing gear should be recorded in the appropriate logbook. For example, when using a 'graball' net you must record your catch in the Scalefish Fishing Record Book.

The information is used for research and management of the fishery. The data provided in this book may at times be disclosed to other government fisheries research and fisheries management organisations.

What happens with my personal information?

Personal information will be collected from you for the purposes of Section 144 and 145 of the *Living Marine Resources Management Act 1995* (LMRMA) and will be used by DPIW for the purposes permitted by this Act.

Your basic personal information may be disclosed to other public sector bodies where necessary or if required by law. Personal information will be managed in accordance with the *Personal Information Protection Act 2004* and may be accessed by the individual to whom it relates on request to the Department of Primary Industries and Water (DPIW). You may be charged for this service.

Why am I legally obliged to use this book?

This catch record and the instructions are forms approved by the Secretary of DPIW for the keeping of records and other information for the purposes of Section 145 of the LMRMA.

The Secretary requires that you keep records in the manner and form as detailed in this form. It is an offence under the LMRMA to provide false or misleading information or make a misleading omission on these catch records. The information and instructions in this book must be read and interpreted consistent with the LMRMA and any rules and regulations made thereunder.

Am I required to carry this book on my vessel?

Yes, the law requires that this book be carried on the vessel and completed on each day fishing occurs.

Who has to complete and sign the catch records?

The supervisor of the fishing licence (rock lobster) for the vessel—that the catch record relates to—is responsible for completing and signing the catch records.

What is the fold out flap for?

You need to use the fold-out flap to prevent your catch record entries appearing on more than one set of pages. Place it under the white copy when writing on a page of the catch record.

When do I start a new catch record?

You should start a new catch record:

- for each month
- if more lines are needed to record the months fishing activity or protected species interactions
- if a different supervisor commences fishing on that vessel.

Do I need to send a catch record when the season is closed for the whole month?

No, if the rock lobster season is closed for every day in the month. If the season was only closed for part of a month you must send a catch record.

When must I send the catch records to DPIW?

You must send the pink sheet of your catch records to DPIW by the end of the following month. For example, you must send your February catch record by 31 March.

What if I make a mistake/s or an error/s?

If you make a mistake you should cross out the incorrect entry and write the correct entry above it. Please initial any changes that you make.

What if the book is damaged?

If your catch record book is damaged to the extent that you cannot fill it in, then, if possible, you should return the unused portion to the DPIW. You will be issued with a replacement book.

What do I do if I lose this catch record book?

You should notify Fisheries Monitoring immediately your catch record book is lost. A replacement fee of $60 will be charged for a new book.

How do I get a new catch record book?

If you need a new book you can either:

- complete the reorder form located toward the back of the book and return it to Fisheries Monitoring, or
- telephone Fisheries Monitoring on the numbers listed below.

Where do I send completed records?

Send all records to:

Reply Paid 44
Department of Primary Industries and Water
GPO Box 44
HOBART TAS 7001

If you need them, reply paid envelopes can be obtained from the **Fisheries Monitoring and Quota Audit Unit.**

What if I need help or advice about the book?

If you have any problems please telephone during office hours:

- **1300 368 550 (toll free number within Tasmania) and ask for the Fisheries Monitoring and Quota Audit Unit**
- **(03) 6233 6171**
- **(03) 6233 6514**

How to complete the rock lobster catch record book

YOUR DETAILS

Month

Write in the month that the catch record relates to on all pages of the catch record.

Year

Write in the year that the catch record relates to.

Nil return

Tick here if you have not fished this month. Complete the remaining vessel and supervisor details then sign the declaration and return the catch record to the Department. Do not tick this box if you go fishing during this month.

Vessel name

Write in the name of the vessel that you used to catch rock lobster on all pages of the catch record.

No. of crew

Write in the average number of crew that you used to catch the rock lobster including the Supervisor on the first page of the catch record.

No. of pots used

Write in the maximum number of pots that you were allowed to use on the vessel during the month. This only needs to be completed on the first page of the catch record

Distinguishing mark

Write in the distinguishing mark of the vessel that you used to catch the rock lobster on all pages of the catch record.

Supervisor (full name)

The fisher named on the fishing licence (rock lobster) as the supervisor. This section only needs to be completed on the first catch record of the month. If a new supervisor is actively fishing on the vessel, a new catch record needs to be completed.

Contact phone no.

The contact phone number of the person who completed the catch record.

Mobile no.

The mobile number of the person who completed the catch record.

Page number (eg 1 of 2)

Write in the number of pages used for that month. For example 1 of 3, then 2 of 3 etc.

FISHING DETAILS

You must complete all of the fishing details for each day that you go fishing for that day on that day.

Date of month

Write in the date of month on the day you fished. For example 3 for the 3rd.

Trip type (D, S, E)

Indicate what type of trip you are undertaking.

1. Write in a "D" if it is a day trip—for example when you start and end the trip on the same day.
2. If you are undertaking a trip that is for more than one day then write in an "S" on the first day of the trip and an "E' on the last day of the trip.

Fishing location

You must record your fishing location using:

- **the block numbers OR**
- **your GPS position to 2 decimal places.**

Block number

Use the locality maps provided by DPIW to work out which block number you fished in. Write this number here. If your pots are set over a number of blocks then record the block number in the **middle** of your set.

or

GPS position latitude and longitude

Write in the position—to a minimum of 2 decimal places—of the **middle** of your set. The latitude and longitude positions are to be recorded on the GDA 94 horizontal datum (Geocentric Datum of Australia). Information about rock lobster catches will only be made publicly available aggregated by 15 nautical mile blocks.

Weight unloaded (kg)

Write in the actual weight, in kilograms, of all rock lobster unloaded on all completed rock lobster quota dockets for that day (includes unloads from vessel, fish cauf and for direct sales).

Type of unload (F or P)

This information is to tell us if you are fully or partially unloading your catch.

1. When you unload **all** your catch—write an "F" in the *Type of unload* section.
2. If you unload only **part** of your catch you should write a "P" in the *Type of unload* section.

Shot type

'Indicate whether the shot is at night or day by writing 'N' for a night shot and 'D' for a day shot. Select the appropriate category on the basis of the majority of the soak time. For example, if you set your pots at 4pm but do not haul them until 3am the following day then this would be considered a night shot. If you set your pots at 2am but do not haul them until midday then this would be considered a day shot.

Depth fished (m or f)

Write in the average depth that you fished at. Indicate by ticking the appropriate box whether the depth is in metres (m) or fathoms (f).

Number of pot lifts

Write in the number of pot lifts that you made to catch your fish. For example, if you did two night shots in the same fishing location with 40 pots each–then you would write 80 in this box. If you had 40 pots on your boat but did not set 4 of them then, and only did one shot, you would write 36 in this box.

How to complete the rock lobster catch record book

DETAILS OF NUMBERS OF ROCK LOBSTER

Numbers dead in pot

Write in the total number of rock lobster that were dead in the pots when hauled.

Legal size discards

Write in the total number of legal size rock lobster that were discarded when sorting your catch. For example, any legal sized catch that you return to the water because of damage or not being the target size for your market etc.

Numbers kept

Write in the number of rock lobster that you kept after sorting your catch.

Running total of rock lobster kept

A running total of the daily numbers kept. The "brought forward" box is provided for the subtotal from the previous page.

Personal use

Record the number of lobsters kept for personal use. Ensure you deduct this amount from your running total of rock lobster caught.

Placed in fish cauf

Record the number of rock lobster placed into a fish cauf. If all the rock lobster are placed in the fish cauf simply record the total from the running total column. If only part of the catch is placed in the fish cauf then the rock lobster will need to be counted.

Unloaded from vessel

Record the number of rock lobster unloaded at a port. If all the rock lobster are unloaded simply transfer the total from the running total column. If only part of the catch is unloaded then the rock lobster will need to be counted.

On the vessel at start of a fishing trip

If there are rock lobster still on the vessel after unloading or placing in a fish cauf the number needs to be recorded for the day of leaving port. This number is the number from the "running total of rock lobster caught" less the number removed from the vessel (ie unloaded, dead, placed in cauf, personal use, catch returned to sea from well).

BYPRODUCT RETAINED RECORD

Complete this section when any byproduct has been retained and was caught in your rock lobster pots—for sale, personal use or use as bait.

Byproduct definition

Byproduct is any fish—other than rock lobster—caught in your rock lobster pot that has been retained for sale, personal use or bait.

Species

Write in the common name of each species you are keeping in a separate column under the word "Species".

Estimated whole weight (kg)

Provide an estimate of the weight (in whole kilograms) for each species retained, including fish used as bait.

Used as bait

Tick here if you are using this byproduct species as bait.

PROTECTED SPECIES INTERACTION RECORD

Complete this section if an interaction occurs with a protected species. *The Environment Protection and Biodiversity Conservation Act (EPBC) 1999* requires all interactions to be recorded.

Interaction definition

An interaction with a protected species means any physical contact between the protected species, an individual (person), vessel or fishing gear. This includes all interactions where a protected species has been caught (or entangled) in rock lobster fishing gear and collisions with a rock lobster fishing vessel. Evidence of a seal damaging a baitsaver would be classed as an interaction with your fishing gear. A seabird landing on the rigging is not an interaction unless the bird hit the rigging and subsequently landed on the deck injured.

Species code

Identify the protected species by writing in the code that corresponds with the species that the interaction was with.

Species common name	Species code
Seal	S
Dolphin	D
Whale	W
Seabird	SB
Albatross	A
Other (please explain in comments)	O

Number

Write in the total number of each type of protected species that the interaction was with. For example if two seals were entangled in your fishing gear you would write in '2' in the corresponding column.

Interaction code

Identify what type of interaction occurred by writing in the code that corresponds with the relevant option listed in the table below.

Interaction type	Interaction code
Damage to fishing gear	GD
Tangled or fouled in gear, released alive	TA
Tangled or fouled in gear, released dead	TD
Collision with vessel, alive	VA
Collision with vessel, dead	VD
Collision with vessel, injured	VI
Other (please explain in comments)	O

Please note

If you are undertaking a legal rock lobster fishing activity and you report an interaction which results in the injury or death of a protected species, you are exempt from prosecution under the *EPBC Act 1999*, because the rock lobster management plan has been accredited under this Act.

How to complete the rock lobster catch record book

Live rock lobster returned to sea from well

Record the number of live rock lobster catch returned to the sea from the well and the date this occurred. **You must not return live rock lobster to the sea from the well without the prior approval of the Secretary.**

Record of dead rock lobster

If you find any dead rock lobster on or from the fishing vessel or fish cauf, record the estimated numbers here and the date they were found.

Comments

You may write in any comments that you want to or more detail regarding your protected species interactions here.

Declaration

When you have completed your rock lobster catch and effort details for the month—sign and date the declaration on each page completed and return the pink copy of the catch record to the Fisheries Monitoring and Quota Audit Unit.

RUNNING QUOTA BALANCE SHEET

This page is not compulsory. It is to be completed by fishers who wish to keep a quota balance sheet of their rock lobster quota for their own use.

If you require an additional Running Quota Balance Sheet you can contact the **Fisheries Monitoring and Quota Audit Unit on (03) 6233 6514.**

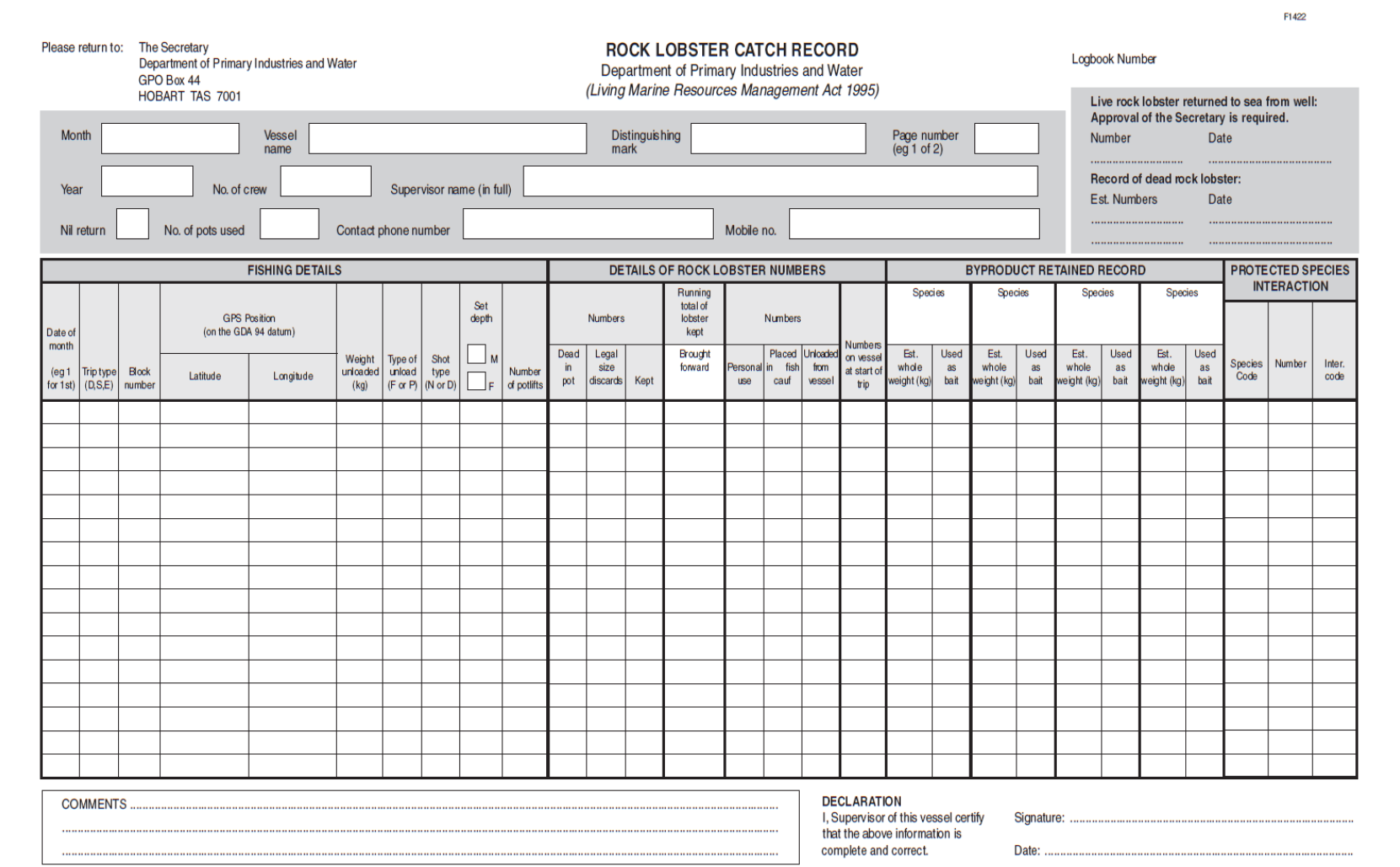
F1422

RUNNING QUOTA BALANCE SHEET

Name ______ Vessel Name ______ Distinguishing Mark ______ Ent. No ______

Date	Quota added from Name/Ent	Number of units or pots	Weight added	Quota docket number	Weight deducted (sale/transfer)	Running balance ±

Date	Quota added from Name/Ent	Number of units or pots	Weight added	Quota docket number	Weight deducted (sale/transfer)	Running balance ±



F1422

Please return to: The Secretary
Department of Primary Industries and Water
GPO Box 44
HOBART TAS 7001

ROCK LOBSTER CATCH RECORD
Department of Primary Industries and Water
(Living Marine Resources Management Act 1995)

Logbook Number

Month | Vessel name | Distinguishing mark | Page number (eg 1 of 2)

Year | No. of crew | Supervisor name (in full)

Nil return | No. of pots used | Contact phone number | Mobile no.

Live rock lobster returned to sea from well: Approval of the Secretary is required.
Number Date
.....
Record of dead rock lobster:
Est. Numbers Date
.....
.....

FISHING DETAILS										DETAILS OF ROCK LOBSTER NUMBERS								BYPRODUCT RETAINED RECORD								PROTECTED SPECIES INTERACTION		
Date of month (eg 1 for 1st)	Trip type (D,S,E)	Block number	GPS Position (on the GDA 94 datum) Latitude	Longitude	Weight unloaded (kg)	Type of unload (F or P)	Shot type (N or D)	Set depth ☐ M ☐ F	Number of potlifts	Numbers: Dead in pot	Legal size discards	Kept	Running total of lobster kept: Brought forward	Numbers: Personal use	Placed in fish cauf	Unloaded from vessel	Numbers on vessel at start of trip	Species	Est. whole weight (kg)	Used as bait	Species	Est. whole weight (kg)	Used as bait	Species	Est. whole weight (kg)	Used as bait	Species	Est. whole weight (kg)	Used as bait	Species Code	Number	Inter. code

COMMENTS .....
.....
.....

DECLARATION
I, Supervisor of this vessel certify that the above information is complete and correct.

Signature: .....
Date: .....

Figure 13.22: Tasmanian catch & effort logbook.

4.8 South Australian Catch Sampling

General

Catch sampling data is derived from two activities:

- Observer catch sampling on commercial vessels
- Voluntary catch sampling by commercial fishers

The catch sampling program is managed by South Australian Research and Development Institute (SARDI).

Workflow

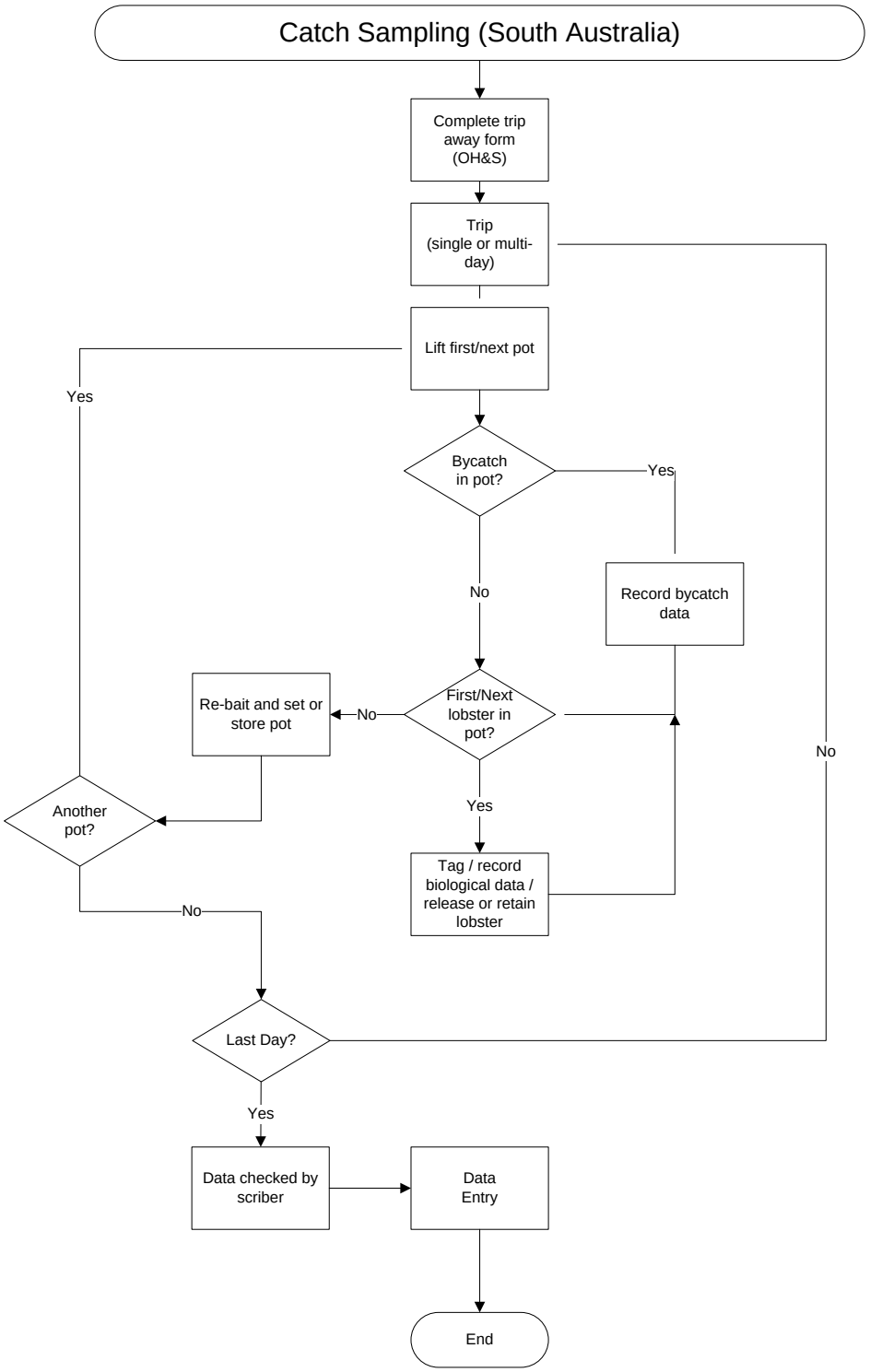


Figure 13.23: South Australian catch sampling workflow.

Cost of Operation

South Australia operates a full cost recovery model for management of the Rock Lobster fishery. Costs specifically associated with catch sampling were not available.

Technology Used

Data is collected manually on field sheets and entered into SARL (South Australian Rock Lobster Database, an Oracle based database and Windows application).

Variables Recorded

For each day of the trip

- Swell height
- Swell direction
- Location (generally a port when applicable)
- Accuracy
- Name of person tagging
- Name of person recording/scribing
- License number

For each pot hauled

- Pot number (haul sequence)
- Depth (metres/fathoms)
- Latitude
- Longitude
- Bottom type (heavy/light)
- For each bycatch species present
  - Species
  - Count

For each lobster

- Tag number
- Carapace length (mm)
- Sex
- Mortality (Y/N)
- Colour (Red/White/Speckled)
- Reproductive state
- Moult
- Damage (Old, New, not always recorded)

Data Schema

See South Australian Catch and Effort schema.

Legislative Requirements

None

Planned Changes

N/A

Wishlist

N/A

Forms

ROCK LOBSTER RESEARCH VOLUNTARY CATCH MONITORING LOG

DAILY DETAILS Depth Units (M or F): Licence No:

Previous 24 hours: Current direction: Name of Fisher Sampling: _____

Swell height (M): Wind speed(kn): Wind direction: Date:

POT DETAILS:

Pot No	Escape gaps (please circle)	No of octopus	Depth	Latitude	Longitude	Comments
	Y N					
	Y N					
	Y N					

LOBSTER DETAILS:

Pot No	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition

Previous 24 hours: Current direction:

Swell height (M): Wind speed(kn): Wind direction: Date:

POT DETAILS:

Pot No	Escape gaps (please circle)	No of octopus	Depth	Latitude	Longitude	Comments
	Y N					
	Y N					
	Y N					

LOBSTER DETAILS:

Pot No	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition

Previous 24 hours: Current direction:

Swell height (M): Wind speed(kn): Wind direction: Date:

POT DETAILS:

Pot No	Escape gaps (please circle)	No of octopus	Depth	Latitude	Longitude	Comments
	Y N					
	Y N					
	Y N					

LOBSTER DETAILS:

Pot No	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition	Carapace length	Sex & condition

CODES: FEMALE=F MALE=M SEX UNKNOWN=U SPAWNY=SP SHORT SETAE=SS LONG SETAE=LS DEAD=D

Queries: Southern Zone and Northern Zone Ph: (08) 8735 1300

Figure 13.24: South Australian catch sampling datasheet.

4.9 Victorian Catch Sampling

General

Catch sampling data is derived from two activities:

- Observer catch sampling on commercial vessels
- Voluntary catch sampling by commercial fishers

The catch sampling program is managed by the Department of Primary Industries (Victoria).

Workflow

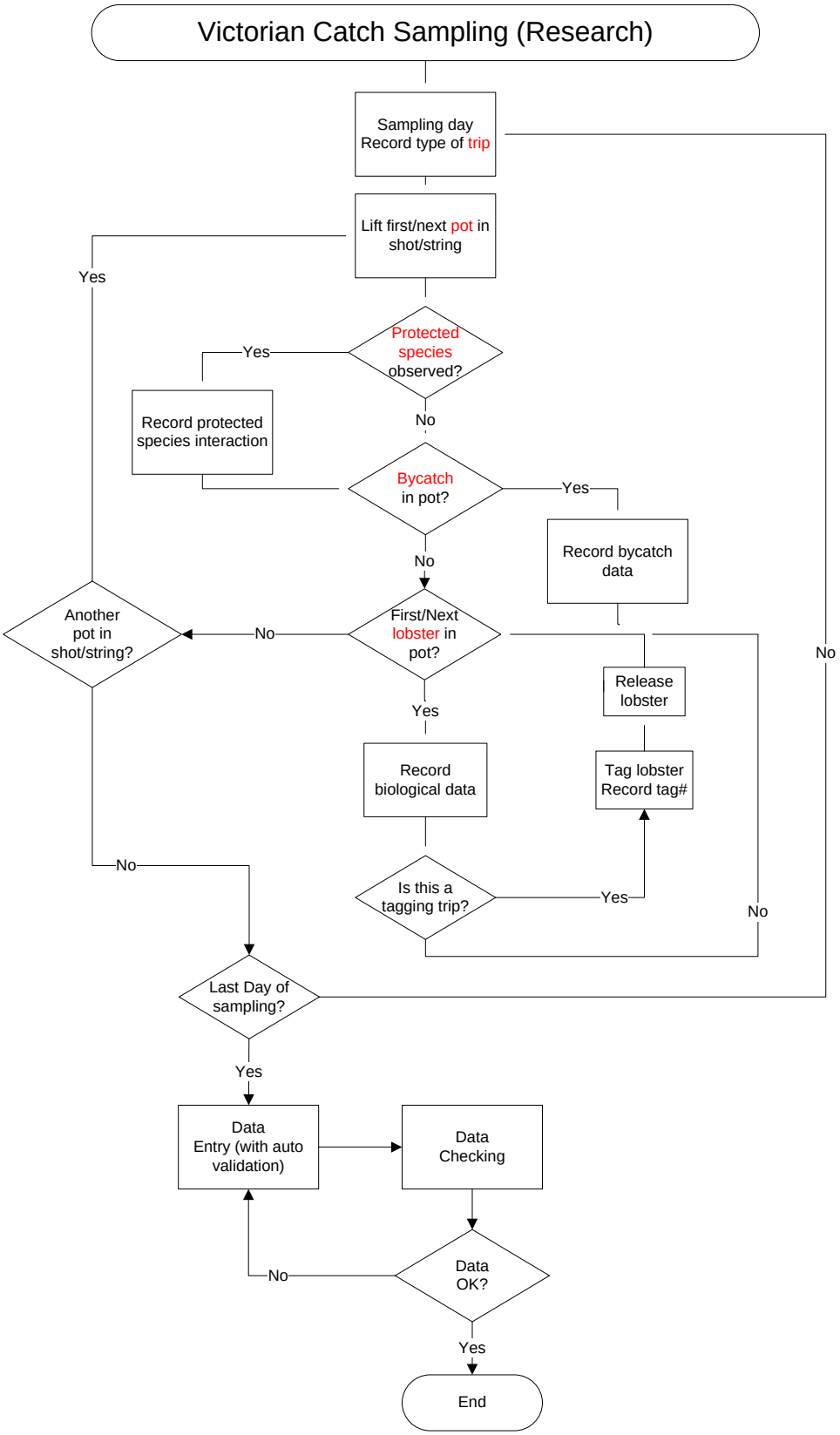


Figure 13.25: Victorian catch sampling workflow.

Cost of Operation

This data is collected as part of the Rock Lobster and Giant Crab Assessment project with an overall budget of $530K. A breakdown of the catch sampling component of the project is not available.

Technology Used

The majority of the data is manually recorded at sea on waterproof paper. Since 2005, a small amount of data has been recorded using digital callipers recording sex, length, female reproductive state and in some cases GPS position.

The database is SAS in Windows XP. All data entry, validation, editing and statistical analyses are conducted using SAS.

Variables Recorded

Trip

Date
Trip Type

- X Translocation
- J Juvenile sampling
- V Fisher voluntary logbook
- L Random sample suitable for LF analysis
- T Tagging only – not random, not for LF
- F Fixed-site (fishery independent) survey
- P Post Settlement study
- C Commercial catch sample
- BC Bycatch sampling – Giant Crab
- BL Bycatch sampling - Lobster
- BLL Bycatch Lobster LF
- BCD Bycatch Crab Digital
- BLD Bycatch Lobster Digital

Tagger
Boat Registration
Skipper's licence #
Number of pots hauled
Number of pots sampled
Number of pots hauled w/no catch

Pot

Site
Pot number (sequenceas hauled)
Pot type – commercial or research
Escape gap open or closed
Latitude (degrees, minutes)
Longitude (degrees, minutes)
Depth
Depth unit (metres/fathoms)
Aarea N – logbook 10' strip number (pre 2001)
Area C – logbook 10'x10'block (from 2001)

	Time of day
Lobster	Person tagging/measuring Person scribing Existing and new tag numbers (animals can have multiple tags) Sex/Length/Maturity/Berried state/Colour/Shell state/Pleopod state/Weight. Status Damage Release position (lat/long/fishing block/research site/depth)
Protected Species Interaction	Species Interaction type (Pos/Neg/Neutral) Count
Bycatch	Species Count Sex/Berried State/Length/Weight/Tag Number (Selected species only)

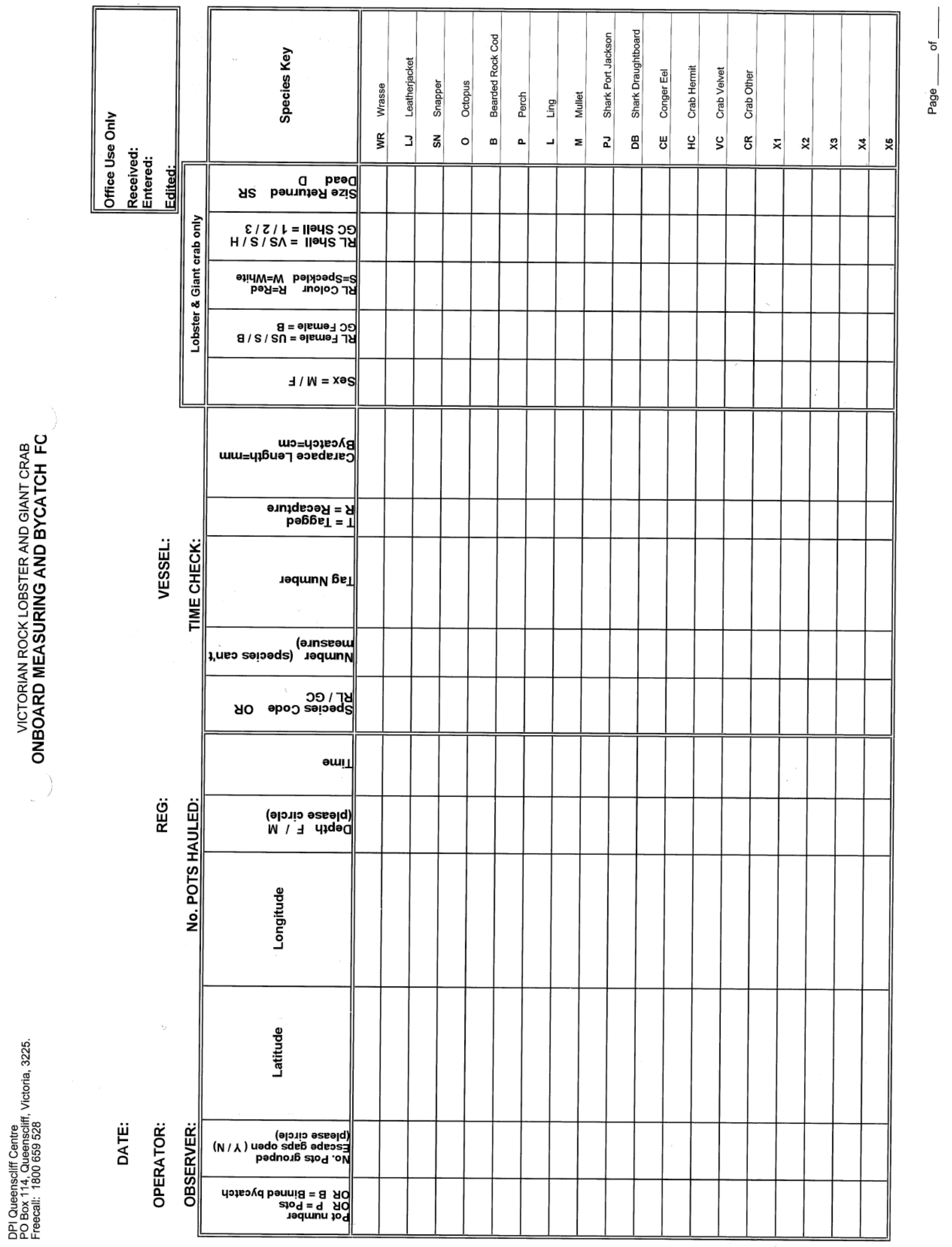
Data Schema
Not Available

Legislative Impact
None

Planned Changes
None

Wishlist
N/A

Forms
See following page.



DPI Queenscliff Centre
PO Box 114, Queenscliff, Victoria, 3225.
Freecall: 1800 659 528

VICTORIAN ROCK LOBSTER AND GIANT CRAB
ONBOARD MEASURING AND BYCATCH FC

Office Use Only
Received:
Entered:
Edited:

DATE:

OPERATOR: **REG:** **VESSEL:**

OBSERVER: **No. POTS HAULED:** **TIME CHECK:**

Pot number OR P = Pots OR B = Binned bycatch	No. Pots grouped Escape gaps open (Y / N) (please circle)	Latitude	Longitude	Depth F / M (please circle)	Time	Species Code OR RL / GC	Number (species can't measure)	Tag Number	T = Tagged R = Recapture	Carapace Length=mm Bycatch=cm	Lobster & Giant crab only: Sex = M / F	Lobster & Giant crab only: RL Female = US / S / B GC Female = B	Lobster & Giant crab only: RL Colour R=Red S=Speckled W=White	Lobster & Giant crab only: RL Shell = VS / S / H GC Shell = 1 / 2 / 3	Lobster & Giant crab only: Size Returned SR Dead D

Species Key

WR	Wrasse
LJ	Leatherjacket
SN	Snapper
O	Octopus
B	Bearded Rock Cod
P	Perch
L	Ling
M	Mullet
PJ	Shark Port Jackson
DB	Shark Draughtboard
CE	Conger Eel
HC	Crab Hermit
VC	Crab Velvet
CR	Crab Other
X1	
X2	
X3	
X4	
X5	

Page ____ of ____

Figure 13.26: Victorian voluntary catch sampling log.

4.10 Tasmanian Catch Sampling

General

This documents catch sampling data management in Tasmania and incorporates Bycatch and Endangered/Threatened species record keeping. Catch sampling data is derived from four activities:

- Research catch sampling (independent of the fishery in a marine reserve)
- Observer catch sampling on commercial vessels
- Volunteer electronic calliper catch sampling on commercial vessels (limited data)

Catch sampling is managed by TAFI. Bycatch and protected species data collected as part of this program is limited to research and observer sampling. Observer sampling is carried out by paid observers.

Workflow

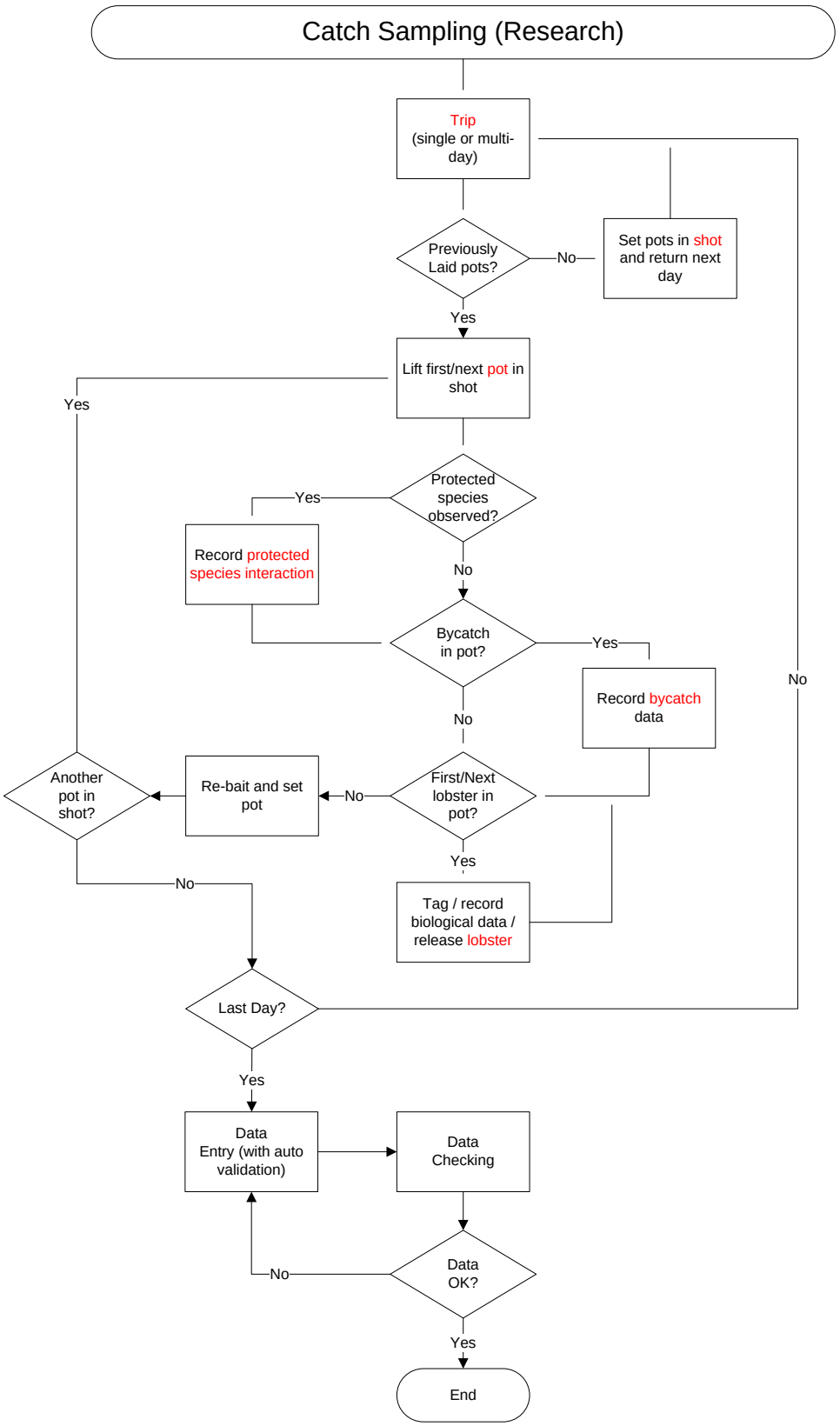


Figure 13.27: Tasmanian catch sampling workflow.

Cost of Operation

Observer catch sampling is paid from the sale of quota allocated to TAFI. Research catch sampling is funded under the TAFI joint venture between UTas and the Tasmanian State Government. Specific costs associated with catch sampling were unavailable.

Technology Used

Tasmanian catch sampling data are recorded manually on paper and entered into an Oracle database (version 10g) using a Windows application (*Craybase*, written in Visual Basic).

Variables Recorded

Trip (a trip can refer to a one or multi day trip setting and pulling pots for catch sampling)

- Project
- Trip Leader
- Start/End Dates

Shot (a shot is a series of pots laid out in a single run)

- Research Site (if applicable)
- Date
- Sequential shot number (for multi shot trips)
- Pot set start/end times
- Pot haul start/end times
- Min/Max depth
- Swell height
- Cloud cover index
- Wind speed
- Wind direction
- Moon day
- Water temperature
- Bait type

Pot (a pot is a single lobster pot normally associated with a shot)

- Position (Lat/Long/Accuracy/Datum/Privacy/Fishing Block)
- Depth
- Haul sequence number
- Pot ID/Tag number
- Pot type
- Open gap count

Lobster (a lobster refers to a single lobster normally caught within a pot)

- Person tagging/measuring/person scribing
- Existing and new tag numbers (animals can have multiple tags)
- Sex/Length/Maturity/Berried state/Colour/Shell state/pleopod state/weight.
- Status
- Damage
- Release position (lat/long/fishing block/research site/depth)

Data Schema

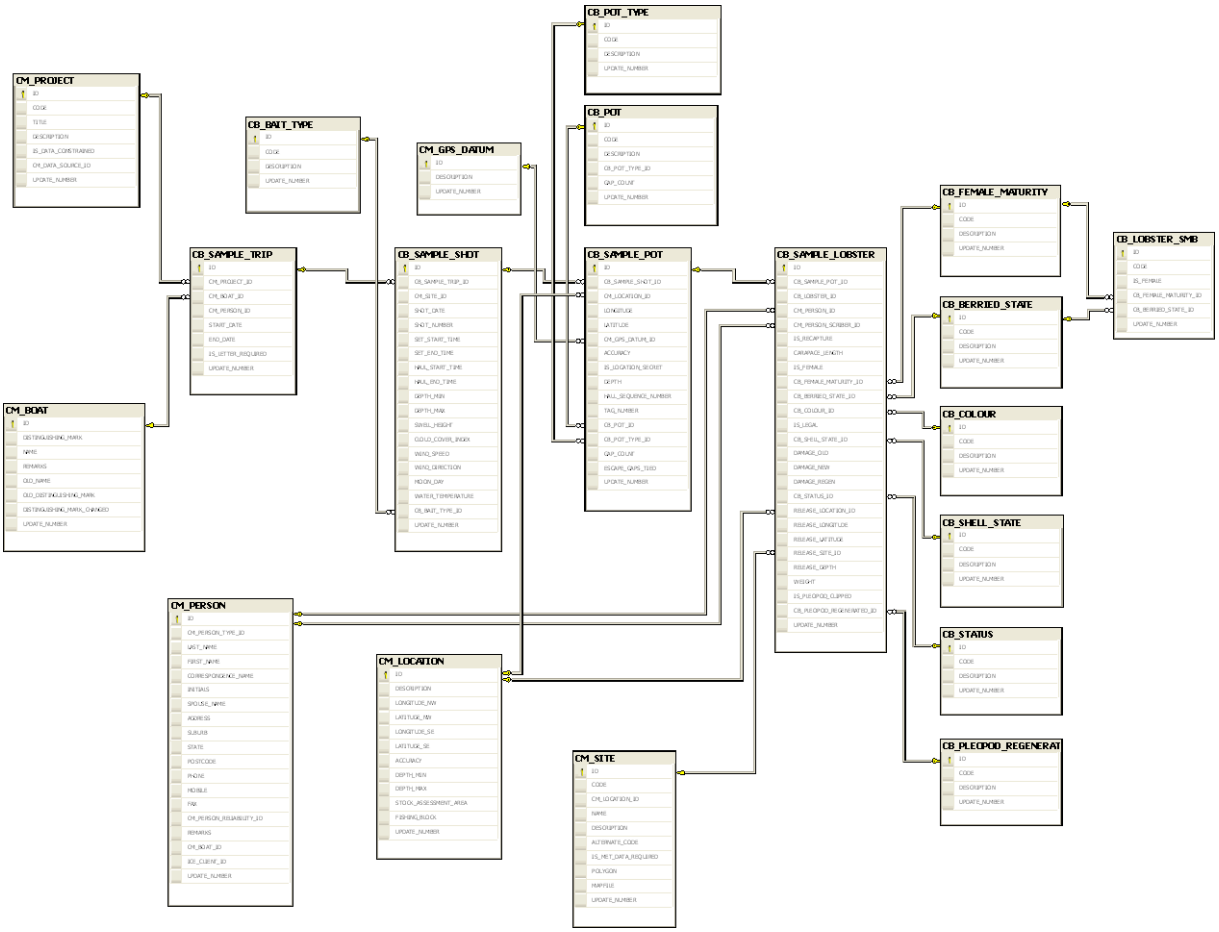


Figure 13.28: Tasmanian catch sampling database schema.

Legislative Requirements

None.

Planned Changes

None.

Wish List

N/A.

Forms

The following form is used for research and observer catch sampling. Tag recapture forms were not available.

DATE:	
SHOT NUMBER (TRIP):	
VESSEL MARK:	
VESSEL NAME:	
SITE:	
Ave SWELL HEIGHT (m):	
WINDSPD (k) :	
WINDDIR:	
CLOUD (1 (clear) to 6 (full cover)):	
MOON DAY (1 to 28, 1 = new, 14 = full):	
WATER TEMP:	
TIMESET 1ST POT:	
TIMESET LAST POT:	
BAIT TYPE (Couta, **JM**acker, **AS**alm**):**	
TIMEHAUL 1ST POT:	
TIMEHAUL LAST POT:	
GPS DATUM	**Decimal degrees?**

PROTECTED SPECIES INTERACTION (**P**ositive, **B**enign, **N**egative)
(Sp-interaction type-number individuals-text: eg 3-B-11-rode bow wave)

SUMMARY

	U/SIZE	SIZE	TOTAL	%SIZE	%Recap
MALE					
FEMALE					
TOTAL					

POTS	TYPE	Egap	LAT	MIN	LONG	MIN	DPTH (F/M)	Pul ORDER
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								

Pot type = **RS** (res. steel), **R2** (Res. steel NZ), **R3** (Res. 4 gaps), **FS** (fisher steel), **WO** (wood)

Protected spp.	**Code**
albatross uniden.	1
cormorant	2
dolphin common	3
dolphin uniden.	4
duck	5
gannet	6
gull Pacific	7
gull silver	8
migrating terrest. bird uniden.	9
other	10
oyster catcher	11
penguin fairy	12
penguin uniden.	13
petrel uniden.	14
prion uniden.	15
raptor	16
seal Aust. fur	17
seal uniden.	18
shearwater short-tailed	19
shearwater uniden.	20
sygnathid uniden.	21
tern uniden.	22
turtle unident.	23
wading bird uniden.	24
whale uniden.	25

Listed (threatened/endang.)	**Code**
alb. black-browed	26
alb. grey-headed	27
albatross light-mantled	28
albatross shy	29
albatross sooty	30
albatross wandering	31
handfish spotted	32
petrel blue	33
petrel northern giant	34
petrel soft-plumaged	35
petrel southern giant	36
petrel white-headed	37
petrel wilson's storm	38
prion fairy	39
seal NZ fur	40
seastar live-bearing	41
shark great white	42
tern Antarctic	43
tern fairy	44
tern little	45
tern white-fronted	46
whale blue	47
whale fin	48
whale humpback	49
whale southern right	50

Figure 13.29: Tasmanian catch sampling field sheet.

4.11 Puerulus Monitoring (All States)

General

This documents puerulus monitoring data management. Because the methodology used in each State is almost identical, a single analysis is provided here with differences between States noted as required.

Workflow

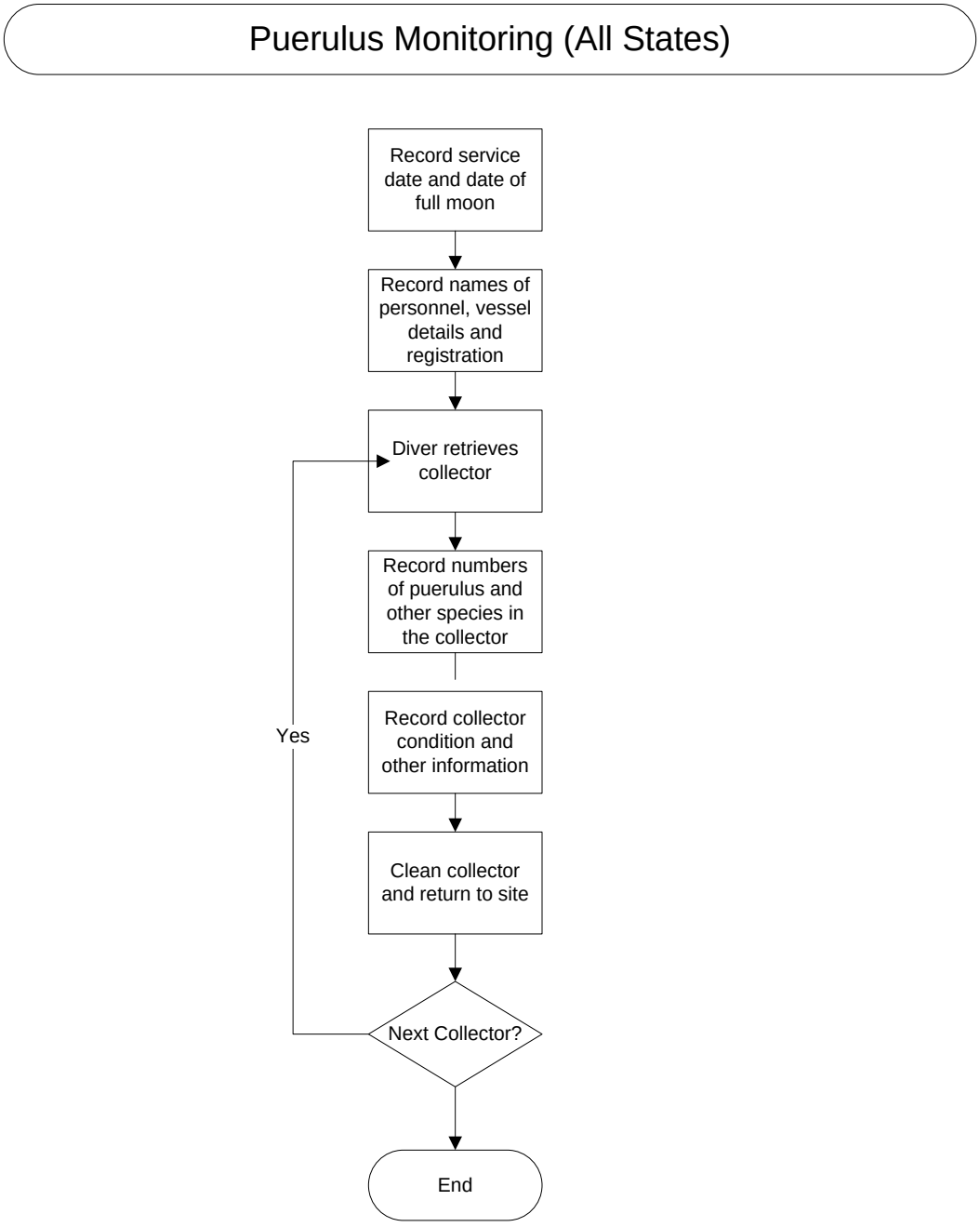


Figure 13.30: Puerulus Monitoring workflow (All States).

Technology Used

In all States, data is recorded on field sheets before entering into data management systems.

South Australia: data is entered and stored in Microsoft Excel spreadsheets.

Tasmania: data is entered and stored into a dedicated Oracle database with a Omnis front end application.

Victoria: data is entered in an SAS database.

Variables Recorded

Date/Time
Full moon date
Location
Collector ID
Number of puerulus at each growth stage (1, 2, 3 and post, stage 4 recorded in Victoria and South Australia)
Number of juveniles
Number of Eastern Rock Lobster puerulus (Tasmania only)
Number of other species (Victoria only)
Collector condition
Comments

Data Schema

Data Schema's vary between the States, but are generally similar and related to the variables recorded above.

Legislative Requirements

None.

Planned Changes

TAFI are currently re-developing their puerulus monitoring system.

Wish List

N/A.

Forms

The following is the sample form used in Victoria. Other States use functionally similar forms.

Puerulus Settlement and Collector Report

SERVICING DATE: ___ / ___ / 2010
FULL MOON: ___ / ___ / 2010

Cleaner _____ Vessel _____ Reg _____

Diver 1 _____ Diver 2 _____ Dive Supervisor _____

		number of puerulus & juveniles						*number present*				
SITE	Head #	P1	P2	P3	P4	PP	JUV	CRABS	SHRIMP	GOBIES	FOULING	COMMENTS
Apollo Bay Harbour	1											
	2											
	3											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
Port Campbell Harbour	1											
	2											
	3											
	4											
	5											
	6											

COMMENTS:

Service Month

Fouling:
4 - fouled to the point that crevices/mesh are blocked
3 - fouled with some obstruction to crevices/mesh
2 - little fouling, no obstruction to crevices/mesh
1 - clean (sand blasted) no obstructions or growths

* Record carapace length and puerulus type on reverse for each site & collector.
* Note changes in reef substrate, if collectors have fallen over etc.
* Record if there have been recent rainfalls or unsettled conditions, storms etc.
* Note any damage to collectors and any requirements for next servicing.

Figure 13.31: Victorian Puerulus Monitoring log.