

Reassessment report Tasmanian Rock Lobster Fishery



Source: TAFI

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1. Description of the Fishery

Target species

The Tasmanian rock lobster fishery has been managed by the Government for over 100 years and has been an important component of the State's fishing industry for over 150 years. The fishery targets southern rock lobster (*Jasus edwardsii*), about 90% of which is marketed live. The species is also taken in New South Wales, South Australian, Victorian and Western Australian waters. The bulk of the catch is taken in South Australian, Tasmanian and Victorian waters. Approximately 1523 tonnes of rock lobster are harvested in the Tasmanian fishery annually, at a landed value of approximately A\$51 million (ABARE, 2004). The gear used is a lobster pot placed on the seafloor and connected to a float on the sea surface.

Licensed fishers are permitted to retain a limited amount of byproduct including octopus, giant crab and a variety of finfish species (some of which are commercial, eg wrasse).

Summary of management arrangements including gear types

Table 1: Commercial rock lobster fishery management arrangements

Management zone	One management zone for the State
Limited entry	312 licences
Limited seasons	2006 closed season females 1 May – 14 Nov inclusive 2006 closed season males 1 Oct – 14 Nov inclusive
Limits of pots on vessels	Minimum of 15 pots, maximum of 50 pots
TAC	Total allowable catch of 1523.5 tonnes
Restrictions on setting pots	Maximum 48 hour soak time
Restrictions on pot size	Maximum size of 1250 mm x 1250 mm x 750 mm.
Escape gaps	One escape gap at least 57 mm high and 400 mm wide and not more than 150 mm from the inside lower edge of the pot, or two escape gaps at least 57 mm high and 200 mm wide and not more than 150 mm from the inside lower edge of the pot
Minimum size limits	105 mm CL for females, 110 mm CL for males
Berried females	Taking of berried females is prohibited
Catch Monitoring	Comprehensive monitoring regime, including documentation and real time reporting

Table 2: Recreational rock lobster fishery management arrangements

Licence restrictions	Rock lobster potting licence - one recreational pot per person, rock lobster diving licence, rock lobster ring licence – four rings per person.
Daily bag limit	Five per recreational licence holder
Possession limit	<p> Holders of a recreational rock lobster licence may possess up to 10 fish, but a person who does not hold a rec. licence is limited to possessing five fish (on land) and a receipt of purchase is required if more than five are held.</p> <p> No person may possess rock lobster on State waters without a recreational licence.</p>
Limited seasons	<p> 2006 closed season females 1 May – 3 Nov inclusive</p> <p> 2006 closed season males 1 Sept – 3 Nov inclusive</p>
Restrictions on setting pots	As per commercial fishers
Restrictions on gear	Pots as per commercial fishers, rings no more than 1 metre in diameter, capture by bare or gloved hand only when diving.
Escape gaps	As per commercial fishers
Minimum size limits	As per commercial fishers
Berried females	As per commercial fishers
Sale or barter of lobsters	Prohibited
Marking	All recreational lobsters must be tail clipped within 5 minutes of landing. No tail-clipped lobsters to be sold.

Fishing Area

The rock lobster fishery management plan provides for the conduct of rock lobster fishing in State waters and out to the 200 nautical mile EEZ. The taking of rock lobster is prohibited except where specifically provided for by this plan. This jurisdiction is provided to Tasmania by way of the Offshore Constitutional Settlement agreement of 1996, for invertebrates (Anonymous 1996). The rock lobster fishery is managed as a single zone (see Figure 1).

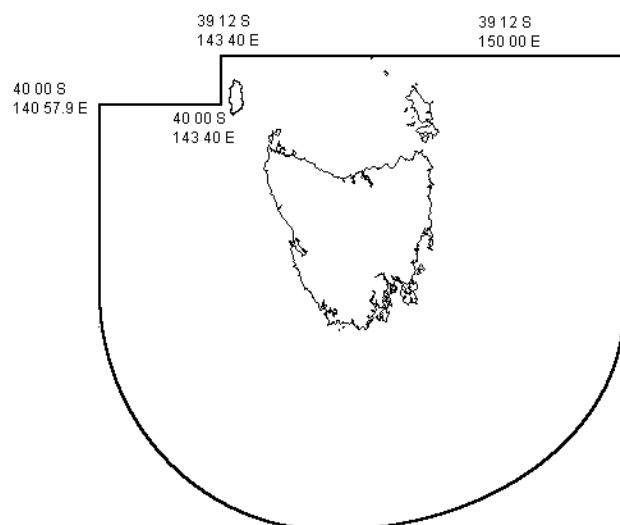


Figure 1: Tasmanian rock lobster fishery area.

Approximately 88% of commercial fishing occurs in depths of less than 50m. The majority of recreational fishing occurs in less than 25m (2004/05 rock lobster assessment report).

Allocation between sectors

A resource sharing framework allocating explicit shares between the commercial and recreational sectors has been implemented in 2006.

Governing Legislation

Governing legislation is provided by the *Living Marine Resources Management Act 1995* and the *Fisheries (Rock Lobster) Rules 2006*. The Marine Resources group within the Primary Industries Division of the Department of Primary Industries and Water has responsibility for the administration of this legislation. Executive decisions are made by the Minister for Primary Industries and Water.

Status of export approval

The fishery was assessed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) in 2001. The fishery was given exemption from export controls and accredited under Part 13 of the Act until February 2007.

2. Management

Changes to management arrangements since 2001

The total allowable commercial catch was increased slightly in 2001 from 1500 to 1523 tonnes.

Since the last assessment in 2001, there were a small number of minor rule amendments in 2002 and 2005. In 2005 a major review of *Fisheries (Rock Lobster and Giant Crab) Rules 2001* was undertaken prior to the expiry of the legislation in early 2006. The review resulted in the development of a new plan.

A review information paper (Anonymous, DPIWE, 2005a) and detailed report (Anonymous, DPIWE, 2005b) on the outcomes of the review process is available on the DPIW website. The new management plan *Fisheries (Rock Lobster) Rules 2006* was implemented on 28 February 2006.

A significant number of rules from the old plan were rolled over into the new plan. The main changes are summarised below.

Resource sharing between the commercial and recreational fisheries

For the 2007/08 quota year, the Minister will set a total allowable catch for the whole fishery. There will be an explicit share allocated to each sector. If the TAC is set at

1700 tonnes or greater the share is 90% for the commercial sector and 10% for the recreational sector. If the TAC is set at less than 1700t, the recreational share is fixed at 170 t and the commercial sector will be allocated the TAC minus 170t. The current commercial total allowable catch of 1523.5t would be maintained (or increased) unless the TAC for the whole fishery was set at less than 1695 tonnes.

The bag limit for an individual recreational fisher will remain unchanged at five lobster per day.

Recreational Fishing Seasons (unchanged)

The female season will open between 1st Saturday in November and 30 April each year.

The male season will open between 1st Saturday in November and 31 August each year.

Special Rock Lobster Licences for the Recreational Fishery

The provision for a Special Rock Lobster Licence will be retained. A licensed recreational fisher may apply for one 14 day licence per season where the possession limit is 15 lobster instead of 10. This provision will come into force on the 1 November 2006.

The previous provision for a single 28 day licence or two 14 day licences per season will not be available in the next season commencing in November 2006.

Commercial Fishing Seasons

The season dates will be fixed for five years by public notice.

The female season will open between 15 November and 30 April each year.

The male season will open between 15 November and 30 September each year.

Length/Tonnage Pot Allocation Schedule

The length/tonnage pot allocation schedule remains in the management plan and the two most common methods of measuring tonnage will be included in the administrative policy covering the application of this schedule.

Quota Monitoring Requirements for the Commercial Fisheries

A number of changes have been made to the quota monitoring requirements when holding or selling rock lobster and giant crab. The main changes include -

Licence holders who wish to direct sell or transport rock lobster can do so without having to apply for a specific endorsement on their licence and there are new monitoring requirements for all types of direct sale including a direct sale quota docket book.

The conflict of interest provisions relating to who can verify the weight on a quota docket have been simplified.

Fishers will be required to carry a quota docket book on a fishing vessel during a trip.

There are improved administrative and practical reporting requirements in relation to holding male and female rock lobster during a closed season and at the end of a quota year.

Over catch

New over catch provisions have been developed to try and resolve the practical issues associated with fishers exceeding their quota unit balance whilst not being able to accurately weigh their rock lobster at sea. It is still an offence to deliberately catch significantly more rock lobster than the quota balance held, however, the old administrative penalty schedule has been deleted. The new provisions provide three options if the over catch is within 30% of the quota unit balance. The fisher can buy or lease quota to cover the over catch, elect to have the over catch taken off next year's quota, or pay a significant financial penalty to the Department. If the over catch is in excess of 30% of the quota unit balance the fisher will be referred to the Police for investigation.

Minimum Pot Holding to Actively Fish

Fishers will still be required to have 15 units on their licence to activate the licence, however, fishers who permanently own 15 units can apply for authorisation to seasonally lease out some of these units if they wish to fish less than 15 units.

Other issues outside scope of 2005 review

The 2005 review also identified a number of issues that could not be addressed within the review timeframe. These are summarised below.

a) Pressure on inshore stocks

This is a complex issue with a number of components.

- commercial/recreational “competition” for inshore fish (east coast)
- within the recreational sector “competition” issues

In 2006 a working group, with CFAC and RecFAC representatives, has been established to identify specific issues and to develop proposals for wider discussion by both sectors.

- ecological issues halting/reversing spread of urchin barrens on the east coast

Progress on this issue is discussed under section - Impacts of fishery on the ecosystem.

- under utilisation of deep water stocks, what is the potential and how to encourage fishers take more deep water fish and less inshore fish

This is being addressed through the new FRDC project *Spatial management of southern rock lobster fisheries to improve yield, value and sustainability – commenced late 2006 (collaborative SA, Vic, Tas)* see section Research and Monitoring for more details.

b) Low egg production and biomass of under size lobsters in North

Progress on this issue is discussed under Recommendation 4

c) Development of social objectives and a strategic policy document

Progress on this issue is discussed under Recommendation 7

Statement of performance of the fishery from the 2004/05 rock lobster assessment report

Table 3: Performance of the Tasmanian rock lobster fishery extracted from the 2004/05 stock assessment report.

Performance indicator	Trigger point		Status in 2004/05
Statewide commercial catch rates	<95% of reference year	✓	140% of reference year
Regional commercial catch rates	<75% of reference year	✓	year >135% of reference
Fishery independent catch rates	Significant decline from matching surveys in the reference year	✓	Area 2 <35m: 175% Area 2 35-50m: 81% Area 8 45-100m: 252%
Statewide legal-size stock biomass	<95% of reference year	✓	187% of reference year
Regional legal-sized biomass	<75% of reference year	✓	>26% increase in all areas
Regional biomass estimates from fisheries independent surveys.	Significant decline between years		Not available
Statewide egg production	< lowest year	✓	>10% increase vs lowest year
Regional egg production	<95% lowest year unless production >40% unfished state (no decline tolerated in areas where production <10% unfished)	✓	where production >54% increase except already high (>40% unfished state)
Undersized lobster CPUE	<95% of reference year	✗	58% of reference year at Maatsuyker Is.
Total catch	<95% TACC	✓	>99% TACC
Size of the fleet	<220 active vessels	✓	231
Recreational catch	>10%TACC	✓	Most recent estimate 7.8%

See Rock Lobster Fishery Policy Document (Anonymous, DPIWE, 1997) for details on current performance measures.

2.3 Monitoring and Compliance

The reporting requirements for commercial fishers and processors are very comprehensive and provide an auditable documentation system and real time reporting of key steps in the landing, transportation and receipt of fish through a telephone reporting system. Compliance with the fisheries rules is managed by Tasmanian Police and includes random at sea inspections, regular inspections of unloading at the wharf, checks at processor premises and covert surveillance. Police records indicate that detected illegal activity is low.

2.4 Consultation Processes

The Act prescribes a consultative process for both the development and review of a management plan. However, in practice the consultation process is often more comprehensive than the minimum requirements prescribed in the Act.

The following consultative process was followed for the 2005 review of the rock lobster and giant crab fisheries management plan –

Consultation with the relevant Ministerial Fishery Advisory Committee, in this case the Crustacean Fisheries Advisory Committee (CFAC) and the Recreational Fishery Advisory Committee (RecFAC); Consultation with any appointed fishing body, in this case the Tasmanian Rock Lobster Fishermen's Association (TRLFA) as well as the industry peak body, the Tasmanian Fishing Industry Council (TFIC) and TARFish, the recreational peak body;

The preparation and distribution of an issues paper and questionnaire to licence holders, licence users, representative bodies, and any interested party, supported by regional port meetings prior to the preparation of a draft management plan;

The draft plan was approved by the Minister for release for public comment, which in practice means sending it to licence holders and various recreational, conservation and aboriginal groups and placing notices of its availability in the papers and on the web;

A public comment period of at least 60 days;

Conduction of regional port meetings to discuss the draft proposals;

Consideration of written submissions by the Department and Advisory Committees.

A report was submitted to the Minister on issues raised in written submissions and recommendations for changes to the draft plans.

Once approved by the Minister, the management plan is tabled in State Parliament for fixed number of sitting days. The legislation may be debated and passed or all or part of the rules may be disallowed.

The subordinate legislation committee may take submissions and conduct a hearing if satisfied the rules are not in the interest of the public, or can not be justified, or have not been made lawfully.

Ongoing stakeholder involvement in the management of the rock lobster fishery is through the expertise based Crustacean Fisheries Advisory Committee (CFAC). This committee is appointed by the Minister under the *Living Marine Resources Management Act 1995* to provide advice about the management of the rock lobster fishery. The committee is comprised of: three industry members nominated by the TRLFA; a representative of the Tasmanian Fishing Industry Council (TFIC); two rock lobster fishers not on the TRLFA board; two giant crab fishers (one owning 15+ quota units); the Executive Officer of the TRLFA; two processing sector representatives; the DPIW fishery manager; a TAFI research representative; a Marine Police representative; the DPIW Chief Fisheries Investigations Officer; and a Conservation and Community representative nominated by the Tasmanian Conservation Trust. There is an Independent Chairperson and the Executive Officer is provided by DPIW - 17 persons in total.

The committee meets four to five times per year and the term of appointment is for two years.

The Crustacean Research Advisory Group (CRAG) provides strategic research planning advice for the rock lobster and giant crab fisheries, to the Tasmanian Aquaculture and Fisheries Institute (TAFI) and the Tasmanian Fisheries Research

Assessment Board. The CRAG is appointed by the Director of TAFI. This group includes research scientists from TAFI, CSIRO and the Australian Maritime College, the commercial and recreational fishery managers, commercial and recreational representatives and one conservation/community representative. The group meets one to two times per year.

The Crustacean Fisheries Assessment Working Group includes TAFI research scientists, the commercial and recreational fishery managers, and commercial and recreational representatives. This group provides advice to TAFI, DPIW and the CFAC relating to the assessment of the fishery and the total allowable catch. The group meets one to two times per year.

2.5 Cross jurisdictional management and International management regimes

There are no cross jurisdictional management arrangements outside of the Offshore Constitutional Settlement agreement (Anonymous, 1996).

There are no international or regional management regimes to which Australia is a party which relate specifically to rock lobster.

3. Research and Monitoring

The annual research and monitoring program for the Tasmanian rock lobster fishery had a budget of approximately \$1.3 million in 2005. Research is mainly conducted by researchers of the Tasmanian Aquaculture and Fisheries Institute (TAFI) based at the Marine Research Laboratories at Taroona. Research projects cover a broad range of issues including improved understanding of the biology of exploited species, the ecological effects of fishing, the size of stocks, the effects of different management strategies and improving the economic yield from the resource.

There are five main themes to the research.

Rock Lobster Stock Assessment - provides regular estimates of the size of the stock and trends in populations. Special focus is on trends in biomass and egg production in different regions of the fishery. Outcomes of alternative management options are evaluated. An ongoing challenge is to improve the quality of our information on the stock. Much of the data comes from commercial fishers. In addition, research observers sample catches aboard commercial vessels and the TAFI research vessel. Recreational catches are estimated separately through contact with a sub-sample of recreational fishers.

Rock Lobster Pre-Recruit Monitoring – predictions of future abundances of legal sized lobsters can be refined with information on the abundance of pre-recruits. Projects are also underway on the effect of ocean currents on larval dispersal, and on the effect of kelp loss on larval settlement.

Developing new techniques to assess stocks – Estimating the size of populations of fished species is valuable for management but typically difficult to do. We tend to rely on indirect data sources, such as catch rates in traps. Several projects are examining ways improving our process of estimating lobster stock sizes. One large

project is developing models that rely on tag-recapture data. New technologies such as microchip implants are providing new opportunities. An important asset for testing new techniques is the scientific reserve in the waters adjacent to the TAFI Marine Research Laboratories. This area has a large population of lobsters that have been studied in detail for many years.

How crustacean fisheries interact with the environment and ecosystem - Several projects examine the interaction between crustaceans and their ecosystem. DNA and stable isotope methods are being used to examine the prey items of rock lobsters. We are also looking at the way that lobsters may regulate populations of other reef organisms such as urchins and abalone. Possible predators of rock lobsters are of interest with work underway on octopus and draughtboard sharks.

Expanding the value of crustacean fisheries - The quality of lobsters exported affects market price and so work has been conducted on grading of lobsters, live holding techniques, and transforming low-value pale lobsters into dark red lobsters. Options for increasing lobster catches are being examined – these focus on the spatial differences in biology around the state.

A comprehensive list of research projects is available if required.

3.1 The major research programs include (extracts from 2004/05 rock lobster assessment report);

Research catch-sampling operations

Annual sampling of research sites established on both the east and south coasts in 1992 was undertaken in October 2005 using *FRV Challenger*. Already this long-term data set has provided valuable insights into spatial and temporal changes in fisheries parameters such as size at maturity. To obtain improved data from broader regions of the fishery, commercial vessels were used to collect data for the 2004/05 fishing season. This has allowed TAFI to increase the coverage of the State to include Areas 1, 4, 6 and 8. More details are provided in section 2.2.2 Rock Lobster Fishery Assessment 2004/05.

Collection of size structure information by commercial fishers using electronic data loggers.

This program commenced in 2004. The loggers are supplied to fishers so that they can measure a portion of their catch, which provides a low-cost method for collecting size-structure data. Data from these loggers are used in stock assessments and are a critical input in conjunction with catch and effort data from compulsory paper logbooks. The advantage of such a logger system over the conventional observer compiled data is that data is collected over a much wider area of the fishery and over the entire season. In addition, the system eliminates the use of paper and manual data entry, which often leads to errors. More details are provided in section 2.2.3 Rock Lobster Fishery Assessment 2004/05.

Changes to the stock assessment model

Changes include; new time periods for considering catch rate and growth data, inclusion of additional detail available in the standardised commercial catch effort data, and transfer of the model to the AD- Model Builder framework.

In the previous model version the catch rates in a given year provide information to the assessment about recruitment that happened a few years previously. Thus, there can be a gap in the last few years in the analysis of recruitment variation simply because any animals recruited to the smallest size classes in the model will take a certain number of years to enter the fishery (which is when the assessment can begin to take account of them – see Figure 4). If this is ignored and recruitment variability away from average recruitment (either greater or smaller than average) does not begin until the year following the time series then the net result is that the variability in the possible stock trajectories can be badly underestimated. To avoid this problem of a time lag between the catch rates and the recruitment that gives rise to them, the projections in the new model now start adding random recruitment variation from when average recruitment is assumed in each Area.

The growth transition matrices have been updated to reflect the many more tag returns that can be used to characterise the growth of rock lobsters around the State. This modification is especially important as it has direct implications for the predicted egg production relative to the unfished egg production. The rock lobster in the assessment areas in the south are now not expected to grow quite so large so their relative egg production has increased. On the other hand, following a revision of the growth characteristics using new tagging data, female rock lobsters in the north are now expected to grow to slightly larger sizes and this implies that the relative egg production will appear to be smaller than in previous assessments. Improved information on the growth patterns of rock lobster around the State can have profound influences on the stock assessment. With the completion of the translation of the rock lobster research database into a modern format there will be even more tags available to characterise growth and these will be included in the analysis of growth ready for next year's assessment.

More details are provided in section 2.2.4 Rock Lobster Fishery Assessment 2004/05.

Biannual recreational catch estimates

Recreational rock lobster catch estimates have been collected for the 2002/03 and 2004/05 fishing seasons (Lyle and Morton 2006). The estimates are obtained using a telephone/diary survey methodology and a random sample of recreational licence holders. The survey provides a wide range of information including catch, effort, area of catch, and gear type used. The catch estimates are incorporated in the stock assessment model. Full reports are available on the TAFI website.

Puerulus settlement monitoring

Settlement of puerulus is monitored at several sites around the Tasmanian coast as part of TAFI's pre-recruit monitoring program. Puerulus collectors are designed to mimic natural rocky reef with crevices that provide shelter for puerulus swimming in to shore from oceanic waters. These collectors have been deployed at Recherche Bay (Area 1), South Arm (Area 2), Bicheno (Area 3), Flinders Island (Area 4) and

King Island (Area 5). Several attempts have been made to establish sites in the remaining Areas on the West Coast, however, all of these attempts have failed due to low catch rates and gear damage to rough seas.

The objectives of the puerulus monitoring project are to provide a measure of recruitment of juveniles into the population. This information has a number of potential benefits including an early warning of large increases or declines in settlement, an improved basis for future projections of the assessment model, and contributes to an improved understanding of larval sources. More details are provided in section 4.1 Rock Lobster Fishery Assessment 2004/05.

Results from this monitoring program and the FRDC project on juvenile growth have provided the first indication that there may be similarities between trends in puerulus settlement and commercial catch rates several years later. This information will be incorporated into the stock assessment process.

A recent review of the program concluded that collection of another five years worth of data and possible expansion of sites is needed to provide more information about whether puerulus settlement data really can be used as a reliable early warning system of changes in recruitment.

Collection of bycatch data during research catch sampling

During October 2003, TAFI commenced a new catch sampling project aimed at sampling broad regions of the fishery using commercial vessels. In conjunction, a project was undertaken to assess the impact on bycatch from commercial potting by using pots with and without escape gaps. This project follows on from the earlier work of Frusher and Gibson (1999) and also compliments an 11 year ongoing fishery independent project that has, as a component of the project, recorded bycatch from research pots without escape gaps. The data collected is used as a basis for assessing the impact of rock lobster fishing on these bycatch species.

3.2 Major projects funded by Fisheries Research and Development Corporation (FRDC) recently completed or underway

Larval Transport and Recruitment Processes of Southern Rock Lobster – completed and;

A synthesis of existing data on larval rock lobster distribution in southern Australia. – completed (both collaborative CSIRO, SA, Vic, Tas and NZ)

The southern rocklobster, *Jasus edwardsii*, (SRL) supports valuable fisheries in southern Australia and New Zealand. Current management practices divide the Australian SRL fishery into seven management zones. However, the long duration of their oceanic larval phase provides ample opportunity for transport between zones. Regional recruitment may thus depend on what happens in either adjacent or distant zones. An individual-based-model of spawning, larval behaviour, growth and mortality was combined with Bluelink – a three dimensional 47 layer, global ocean model in order to simulate the transport processes of SRL larvae over the period 1993-2004. Results indicate that although management zones are connected by larval transport, there is some degree of regional self-recruitment. This varied in extent between zones. Zones also varied in their success at contributing recruits across the

fishery, with the highest rate of contribution coming from the SE area of South Australia and from western Victoria. We found no correlation between any environmental variables and settlement of puerulus that would explain the interannual differences observed over the period. Results may be useful for predicting the regional benefits of rebuilding spawning stock biomass.

Can production in the southern rock lobster fishery be improved? Linking juvenile growth, survival and density dependence to sustainable yield – completed (collaborative Vic, SA and Tas).

This study developed an artificial reef structure, which enabled studies of growth and survival of juvenile lobsters in their first year after settlement to be undertaken. This technology will be applicable to future studies of the early life history of the benthic stages of the southern rock lobster. Ecological studies of temperate reef communities, which are currently impossible due to the complexity of the reef system, could also benefit from the use of artificial reefs.

Knowledge of the complex early juvenile phase of lobsters has been increased substantially through this project. Significant advances include the first estimates of survival and growth rate for newly settled and juvenile lobsters. In addition, the study identified reefs that appear to act as nursery reefs that supply juveniles to adjacent regions for the first time in this species.

Links established between puerulus settlement and recruitment justifies the incorporation of puerulus settlement indices into assessment models for both predicting future catches and as indicators of longer-term trends in recruitment.

Developing tagging models and validating assumptions for estimating key fishery assessment parameters in rock lobster fisheries – underway and;

Assessment of Broad Scale Exploitation Rates and Biomass Estimates for the Tasmanian Southern Rock Lobster Fishery – completed.

There is a common need in the assessment of all fisheries to obtain precise estimates of exploitation rates and/or biomass. In the Tasmanian rock lobster fishery, biomass is a key performance indicator and change in biomass is the primary driver for recommendations of future Total Allowable Commercial Catch (TACC) allocations by the Fisheries Advisory Committee. In recognition of this need, both the Tasmanian Government (1992-1997) and FRDC (1997-2001) have funded projects to investigate methods to estimate biomass independent of the fishery.

Fishery independent estimates are essential because estimates derived from fisher's catch and effort are often biased as exemplified by the change in the link between catch rate and abundance following the introduction of the ITQ management system in Tasmania (FRDC 1999/140). Although initially promising, exploitation rate and biomass estimates based on changes in the population during the fishing season proved unreliable (FRDC 1997/101). Both the Industry and Managers have identified the need to explore new methods to obtain precise estimates of these important performance indicators.

Multi-year tagging models have been identified as a promising way of estimating

these parameters because they address the failings (variable catchability and recruitment) in the population derived estimators. Initial trials in northwest Tasmania proved very successful and support the potential of this approach. However, tag returns from fishers are unpredictable and there is an immediate need to determine ways of improving tag reporting rate to optimise the output of tag based models. Furthermore, the models applied to northwest Tasmania relied on a minimum of two tagging events occurring each fishing season. As each tagging event occurred during a different period of the moult cycle, there is a need to validate the tag retention and tag induced mortality rates associated with these different tagging times. Other factors relating to size, sex, damage and their interactions with different tagging times also need further investigation. A careful evaluation of other means of improving the precision of estimates from tagging models is seen as necessary, prior to the implementation of a large scale tagging program.

Validating the assumptions associated with the use of tagging models, demonstrating ways to test for these assumptions and the precision of fishery assessment outputs is needed prior to recommending these models for use in other fisheries.

Spatial management of southern rock lobster fisheries to improve yield, value and sustainability – commenced late 2006 (collaborative SA, Vic, Tas)

Quota management of rock lobster fisheries in southern States combined with higher prices for shallow water lobsters has driven effort inshore. This is because fishers now manage their business to optimise the value of each kg, not maximise catch. Deeper water lobsters are often uneconomical to fish under current management as beach price can be as little as \$4/kg above lease price (as lease price responds to beach price of shallow water product). This has produced an unusual situation in fisheries management where fishers are shifting effort away from high catch rate areas and into more depleted areas. There is now a management need for improved ability to follow trends in stocks at different depths and to evaluate novel harvest strategies suited to these spatial issues.

Adjusting harvest strategies to take account of spatial patterns in the biology of lobsters and patterns in the fleet has the potential to substantially increase yield, value and sustainability of the fishery. For example, preliminary modelling of the Tasmanian fishery has shown that regional size limits could double egg production in northern regions where levels are currently of concern, while simultaneously increasing yield by around 25%. Shifting effort into deeper water by means such as specific deep-water quota would be expected to increase yield given that these stocks are currently under-exploited. To collect data on deepwater stocks, it is proposed to trial a system where commercial fishers volunteer to fish a proportion of their quota units in deep water and collect length frequency data on a proportion of their catch. There will also be an extensive tagging program to collect growth data. Fishers who participate will be permitted to harvest an additional 50 kilograms of rock lobster for every quota unit (145kg) committed to the trial. The 'incentive' kilos will be capped at 35 tonnes. This research tonnage is outside of the TACC. Harvest levels of deepwater stocks have dropped from about 250t ten years ago to around 60 t in 2005. Translocating lobsters from slow to high growth areas leads to increased productivity and also higher beach price per lobster due to improved colour. Bio-economic modelling has indicated that gains in net economic yield could be more than doubled in many cases through translocation (FRDC 2005/217). These opportunities also exist

to varying degrees in South Australia and Victoria.

Towards an integrated multi-species management of Australia's south-east reef fisheries: a Tasmanian example - underway

The project has the following objectives:

- 1) To determine the impact of rock lobster fishing on abalone population dynamics
- 2) To evaluate the effect of abalone fishing on the community structure of the reef
- 3) To understand rock lobster predator-prey relationships, particularly in relation to changes that may have occurred as a consequence of fishing.

This project is the first of a larger strategic focus that moves away from species based management towards integrated ecosystem management. It will give impetus to:

- a) Understanding the implications of management of one resource on another,
- b) Measuring the impacts of increased utilisation of the marine ecosystem on the health of all components of the ecosystem (eg. commercial and recreational fishing, tourism, and aquaculture),
- c) Establishing baseline data that can be used to monitor environmental change (e.g. introduced pests, global warming),
- d) Meeting the increasing need of consumers for environmental accreditation (e.g. MSC, EA). This is particularly the case for diversification of future markets.

This project addresses several aspects of Australia's Marine Science and Technology Plan.

Program 1 - Understanding the Marine Ecosystem

Objective 6: To understand the biological processes in Australia's oceans

Objective 7: To understand the dynamics of Australia's marine habitats and ecosystems

Program 2 - Using and Caring for the Marine Environment

Objective 1: To ensure the maintenance of healthy and properly functioning ecosystems through the development and application of effective monitoring and assessment procedures and sustainable management practices

Objective 6: To improve the productivity and sustainability of wild harvest fisheries, and to improve understanding of the relationship between fished stocks and the ecosystems that support them.

The project addresses FRDC's strategic vision to move towards assessment and management of Australia's fisheries at the ecosystem rather than single species level. A concern in embracing integrated multi-species or ecosystem based management is the breadth of ecosystem issues that can be tackled. By focusing on specific issues identified by our stakeholders this project has the potential to demonstrate the benefits of multi-species management in two of SE Australia's most valuable fisheries, and the need for this approach to be adopted as the future management framework.

At the TasFRAB Wildfish Strategic Planning Workshop held in 2003 to develop Tasmania's 2004-2009 Strategic Fisheries Plan, both Industry and Government

recognised that a healthy and productive reef ecosystem is essential for maximising the social, economic and aesthetic returns to rural coastal populations in Tasmania.

At the Southern Fisheries Management Workshop (SFMW) held in November 2003, managers highlighted three separate approaches that needed to be addressed in pursuing ecosystem based management. These were a systems approach that described a management unit and incorporated all inputs into the system (e.g. Westernport Bay and associated catchments, Great Australian Bight), a risk assessment approach and an understanding of processes that drive systems. TAFI's approach that focuses on understanding process based on observed patterns was endorsed by the SFMW.

Evaluating the Effectiveness of Marine Protected Areas as a Fishery Management Tool – completed.

The survey protocol agreed at a national project workshop (Anonymous, DEH, 2005) has been used in baseline surveys undertaken in new or proposed MPAs in Western Australia, Victoria, Tasmania and New South Wales. The Victorian State Government has since established an ongoing MPA monitoring program using the project survey protocols.

The study has clearly demonstrated the effects of closure on plant and animal communities in the reserves, and through a comparison with fished sites is revealing much about the effects of fishing on reef communities. This has direct applications for fisheries assessments under the *EPBC Act*.

Models suggest that MPAs are limited in terms of their usefulness as a fisheries management tool, especially for the Tasmanian rock lobster and abalone fisheries, but also for quota-managed fisheries in general.

In the Tasmanian lobster and abalone fisheries where catch and effort are effectively limited, it was concluded that the introduction of MPAs as a fisheries management tool would be inferior to present management options. Indeed, if introduced without reducing catch or effort by amounts equivalent to that in the prospective closed area, closed areas were a risky strategy that could lead to a degradation of the fishery (this appears to be a general conclusion for species with low movement rates).

True ESD fisheries management offers a potentially better outcome than no-take MPAs for biodiversity conservation.

This is not to suggest that MPAs have no place in marine and coastal management. This study clearly demonstrates the value of small MPAs as reference areas for research on the biology of exploited species and in understanding the ecosystem effects of fishing. Both add to the fisheries management toolbox and lead to a greater fisheries resource security.

4. Catch data

(Data in this section is taken from the Rock Lobster Fishery Assessment Report 2004/05)

4.1 Retained catch and harvest by each sector

Commercial

Total commercial landings 1513.8 tonnes

Recreational

Estimated annual catch 2004/05 – 119 tonnes

Indigenous

Catch is estimated to be <5% of recreational catch (Ford 2001)

Illegal

There is no estimate of illegal catch, but again it is not thought to be large. Tail clipping of recreational catch and tagging of domestic sales have been introduced in recent years (1995 and 1998 respectively) to minimise illegal activity. Police records indicate that detected illegal activity is low. This is thought to be the case because the few breaches are found in the high number of vessel and processor inspections.

Discards

Mandatory escape gaps minimise the catch of undersize rock lobster. Possession of undersize, berried females or females caught during the closed season is prohibited, these rock lobster have to be immediately returned the water.

Estimates of natural survival have been obtained from numerous tagging studies and these have provided estimates of around 0.1 instantaneous natural mortality (equates to around 10% per annum) although many estimates have approached zero. Clearly natural mortality is typically very low. Estimates of natural mortality actually encompass a range of other "losses" aside from true natural mortality, including tag loss emigration from the fishable population, and also discard mortality (because a tagged lobster has be discarded before it can be recaptured). Researchers have concluded that discard mortality in this fishery is extremely low because of the overall low value of estimated natural mortality.

Recent developments in tagging models by Stewart Frusher (TAFI) and John Hoenig (VIMS) have allowed the different components of "natural mortality" to be evaluated from tagging data. This has lead to some informative results, most importantly that tag-induced mortality can be significant at some times of the year and thus these times should be avoided for research surveys. Discard mortality can be isolated from tagging mortality when lobsters are recaptured with a tag and then released (so that they are discarded, but not tagged). Discard mortality appears to be so close to zero that it could not be estimated, despite very large sample sizes of many 1000's of tagged lobsters. This outcome is not surprising given that the industry relies on the sale of live lobsters into Asia and losses are typically less than 5% through the entire chain of capture, transport by vessel, holding in processing facilities for periods up to weeks, then freight without water for long distances.

Total catch of target species taken in other fisheries (if applicable)

No rock lobster byproduct is permitted in other fisheries within Tasmania's jurisdiction (giant crab fishers must hold a rock lobster licence and quota to retain rock lobster).

4.2 Byproduct species

Table 4: Catch of byproduct species (reported by species) 2004/05

Average reported catch greater than 1 tonne	Average reported catch less than 1 tonne
Octopus	Blue throat wrasse
Rock Cod	Other wrasse species
	Leatherjacket species
	Conger eels
	Velvet crab
	Red bait crab
	Giant crab
	Snapper
	Gurnard perch
	Gummy shark
	Knife jaw
	Jackass Morwong
	Striped Trumpeter
	Rock Ling
	Barber Perch

4.3 Bycatch species

Table 5: Species list of bycatch caught in October 2004 from 3115 pot lifts. (bycatch research data)

Common name	Scientific name	Total number
Hermit Crab	<i>Trizopagurus strigimands</i>	2993
Rough Rock Crab	<i>Nectocarcinus tuberculosis</i>	235
Southern Conger Eel	<i>Conger verreauxi</i>	87
Draughtboard Shark	<i>Cephaloscyllium laticeps</i>	84
Red Gurnard Perch	<i>Halicolenus papillosus</i>	39
Cleft Fronted Shore Crab	<i>Plagusia chabrus</i>	36
Rosy Wrasse	<i>Pseudolabrus psittaculus</i>	35
Velvet Leatherjacket	<i>Parika scaber</i>	35
Octopus	<i>Fam. Octopodidae</i>	31
Bearded Rock Cod	<i>Pseudophycis barbata</i>	29
Barber Perch	<i>Caesioperca rasor</i>	21
Coral Perch		21
Blue-throat Wrasse	<i>Pseudolabrus tetrians</i>	18
Giant Tasmanian Crab	<i>Pseudocarcinus gigas</i>	18
Ascidian		17
Shark-Swell		15
Brown-Striped Leatherjacket	<i>Meuschenia australis</i>	12
Leatherjacket-unidentified		11
Rock Cod-unidentified		10
Southern Rock Cod		9
Starfish-unidentified		8
Morwong	<i>Nemadactylus macropterus</i>	6
Red Bait Crab		6
Degen's Leatherjacket	<i>Thamnaconus degeni</i>	4
Great Spider Crab	<i>Leptomithrax gaimardi</i>	4
Mosaic Leatherjacket		4
Perch-unidentified		4

Purple Wrasse	<i>Pseudolabrus fucicola</i>	4
Starfish	<i>Coscinasterias calamaria</i>	3
Wrasse-unidentified		3
Port Jackson Shark	<i>Heterodontus portusjacksoni</i>	2
Spider Crab-unidentified		2
Stripey Trumpeter		2
Urchin-unidentified		2
Cobbler		1
Cuttlefish	<i>Sepia sp.</i>	1
Fish-unidentified		1
Pink Ling	<i>Genypterus blacodes</i>	1
Six-Spine Leatherjacket		1

This research data (table 5) was collected in research pots with no escape gaps. This research program estimated that there was an average percentage reduction of by catch per pot of >40% with escape gaps.

4.4 Effort data including information on any trends

Catch rate data and trends are summarised in the table 6 (from rock lobster assessment report 2004/05).

Table 6: Change in annual commercial catch-rates. Negative values indicate a decline in the change. The reference year is defined as the year with lowest CPUE among 1993, 1994 and 1995. Included also are commercial catch statistics for 2003/04.

Area	Reference Year	Commercial catch rates (kg/pot lift)				% change		Catch stats (March 2004-Feb. 2005)	
		Ref. Year	2003/04	2004/05	vs	vs	Catch (t)	Effort (1000 potlifts)	
					Ref. Year	2003/04			
Statewide	1994	0.82	1.09	1.15	+40	+6	1502*	1301	
1	1994	0.52	0.83	0.96	+84	+16	165	172	
2	1994	0.54	0.89	0.96	+77	+7	130	136	
3	1994	0.44	0.69	0.74	+68	+7	86	116	
4	1994	0.63	0.97	1.04	+65	+7	178	171	
5	1995	0.90	1.20	1.22	+35	+1	296	243	
6	1995	1.21	1.74	1.64	+35	-6	185	113	
7	1994	1.11	1.51	1.60	+44	+6	125	78	
8	1993	0.77	1.18	1.25	+62	+5	338	271	

* estimated catch from logbooks (where effort is also recorded) as compared to total (QMS) landed catch.

5. Status of target stock

A summary of the status of the stock has been extracted from the rock lobster assessment report 2004/05. For stock assessment purposes the fishery is divided into eight assessment areas (refer figure 2).

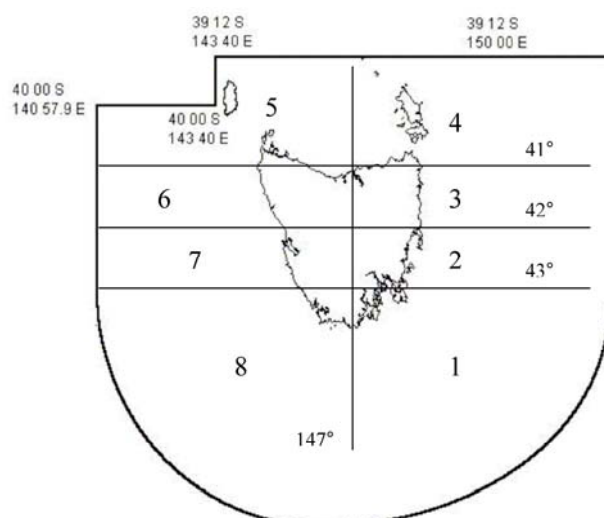


Figure 2: The boundaries of the eight Stock Assessment Areas and the area of State waters for the rock lobster fishery provided by the offshore constitutional settlement (OCS).

Trends in biomass and catch rate were generally very positive. Catch rates were standardised to remove effects of depth, block, day/night, month and skipper. Assessment Areas 1 (SE), 8 (SW), and 7(W) all exhibited continued increases in standardised catch rates relative to 2003/04, and this was despite the catch taken from all three Areas increasing over those taken in 2003/04.

In assessment Areas 2 (E), 3 (E) and 4 (NE), the standardised catch rates exhibited a strong increase during 2004/05, reversing the previous trend of decline seen in 2003/04.

There has been an increase in the annual non-standardised commercial catch rate this quota year in all stock assessment areas except for Area 6 (W), where there was a 6% decline in the catch rate compared to the 2003/04 quota year. Catch rates in this Area are the highest for the State at 1.64 kg/potlift so this slight decline is of little concern and may be related to a continued shift of effort into shallower waters.

There has been a small increase in the non-standardised catch rates in the NE (Areas 3 and 4) over the past quota year suggesting stability or slight rebuilding of stocks in these Areas.

Since 1999, average lobster weight has tended to increase in many areas of the State (Area 1, 3, 4, 5, 7 and 8). The concurrent increase in both average weight and catch rate in Areas 1, 3, 5, 7 and 8 is indicative of stock rebuilding in these areas.

All Areas show evidence of increasing catch-rates in shallower waters (i.e. <70 m) in the past quota year. Previous reports had expressed concern at declines in shallow water catch rates but this trend appears to have reversed to some extent over the last year in Areas 3, 4, 5 and 6.

Model estimates for exploitable biomass indicated relative stability, with only Area 3 (E) exhibiting a small negative change of 1.5%.

Egg production in all four northern Areas remains below the threshold of 25% of virgin egg production. Estimates of egg production in Areas 3 and 6 are only

marginally below 25% and model projections indicate that these Areas are likely to move above this target level in the next few years. Areas 4 and 5 are of more concern. Although stock rebuilding in these areas has been strong, the levels of egg production appear unlikely to increase above targets of 25% of virgin in projections of the current management arrangements.

The stock assessment model predicts that the current TACC continues to permit significant Statewide stock rebuilding for at least the next three years, with the median expected increase predicted to be an increase of about 10%. There remains a possibility that the exploitable biomass will remain stable rather than growing but this is not the most likely outcome. Some assessment areas are exhibiting stronger positive trends than others. Areas 1 and 8, for example, are exhibiting strong performance with increasing catches associated with increased effort and model predicted increases in exploitable biomass. While these model predictions are positive with regard to the stock status they are only for the next three years. Caution is still required, especially beyond the next three years, as the continued recovery of the Tasmanian rock lobster fishery is dependent upon the balance between catches and recruitment levels. Any further recovery will require future recruitment to the fishery to at least be similar to previous annual recruitment levels. The East Coast puerulus settlement indices for 2003–2005 are the lowest recorded to-date and the impact that these low values will have on the rebuilding process is currently unknown. If they do represent a hole in coming recruitment levels their impact is expected to influence the legal-sized biomass in approximately 2009 (about 6 years after first settlement).

There is currently a shift in the fleet dynamics with more effort being directed away from the North into the South, which opens the possibility of improvement in egg production in the north. Statewide egg production is predicted to increase slightly over the next three years with the median predicted total egg production just exceeding 50% of unfished production. Areas 4 and 5, in the north, are expected to remain stable or increase slightly, although they both remain below the target of 25% of unfished egg production.

6. Interactions with protected species

(Data from 2004/05 rock lobster assessment report)

For the period 2004/05, 237 protected species interactions were reported by fishers (refer figure 3). The majority of these reports simply indicated that an interaction had occurred so the species and fate of the protected species was unknown. Approximately 26% of reported interactions (n=56) provided details of the species involved. All of these were seals, except a single reporting of whales swimming near the fishing vessel.

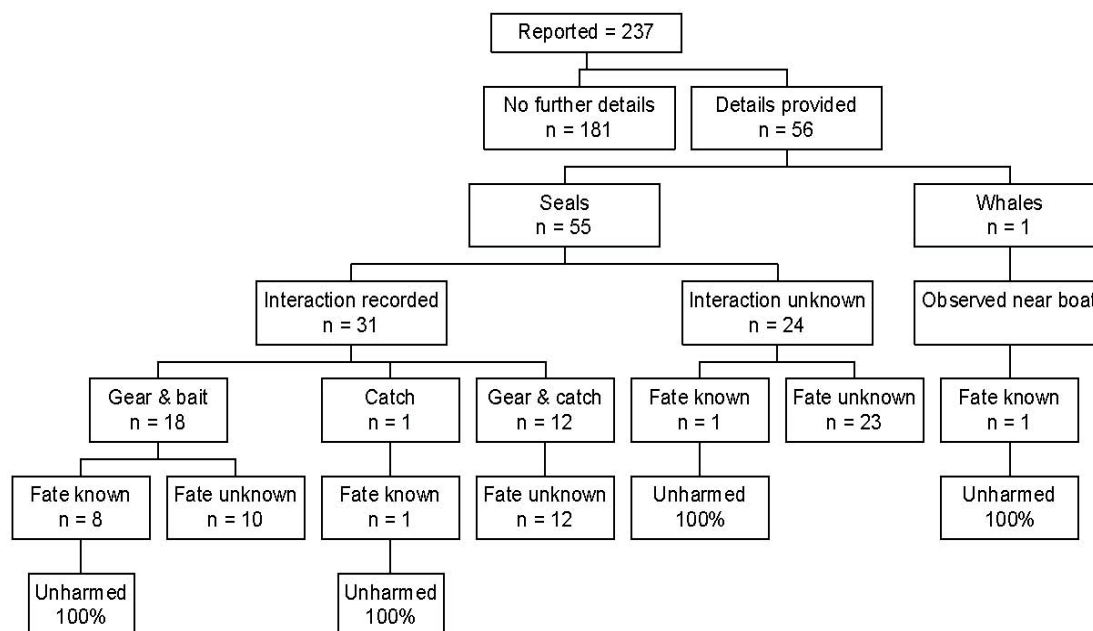


Figure 3: Schematic of reported interactions between commercial fishers and protected species extracted from the 2004/05 Rock lobster fishery stock assessment.

The stock assessment also reports that there appears to be ambiguity regarding the reporting requirement for “interaction”. Some fishers consider that a seal eating discarded bait is an interaction, while others do not.

This issue was discussed at the TRLFA’s recent open forum and it was evident that fishers did not have sufficiently clear guidelines.

A risk assessment of the impact of interactions with seals, whales, seabirds and turtles and rock lobster pots was conducted by the Technical working group reporting to DEH on fishing risk assessment for the development of MPAs. The risk assessment report (Anonymous DEH 2005) states that the risk of entanglement, or pup seals being caught in a pot is low.

Whilst the risk of interactions resulting in mortality appears to be very low, DPIW intends to liaise with DEH to develop clearer reporting guidelines for fishers. There is also a clear need to encourage fishers to improve the information provided. Currently fishers tick a tick box on their catch effort logsheet if an interaction occurs. There are protected species interaction forms at the back of the logbook for fishers to provide more information if possible about the interaction. Encouraging higher rates of completion of the interaction form should be possible using education opportunities at industry meetings and the frequency of one on one communication between logbook monitoring staff and fishers.

7. Impacts of the fishery on the ecosystem in which it operates.

A risk assessment of the impact of the rock lobster pots on a range of habitats was conducted by the Technical working group reporting to DEH on fishing risk assessment for the development of MPAs. The risk assessment report (Anon DEH 2005) states that the foot print for the fishery is small, pots are heavy enough to avoid movement with currents on the sea bottom and there is a level of natural disturbance of the bottom which increase in shallower depths. The consequences of damaging fragile species (eg bryozoans) by setting pots on the bottom was likely to be inconsequential. The overall risk rating was "low".

A number of research projects have been developed to gain better understanding of the ecology of major components of wider ecosystem within the fishery, particularly, the significant interactions between rock lobsters and other species. The rock lobster fishery assessment report 2002/03 provides summaries of octopus- lobster interaction research and lobster draughtboard shark interactions.

Octopus is the most significant byproduct species. The study examined research fishing data to determine if the number of octopus caught and the number of lobsters killed by octopus in rock lobster pots varied over a range of spatial and temporal scales. The hypothesis that locations or times of the year that demonstrate higher lobster catch rate would have corresponding higher catch rates of octopus and lobster mortality was not proven correct in this study.

Draughtboard sharks are a predator of rock lobster and are a bycatch species for the fishery. Research analysed shark gut contents and looked as seasonal trends. About

23% of sharks analysed had rock lobster in their gut contents. There were no clear seasonal trends.

The rock lobster fishery assessment report 2003/04 reports on an assessment of potential threats to the rock lobster fishery through the formation of urchin barrens of the long spined sea urchin (*Centrostephanus rodgersii*) in eastern Tasmania. The urchin is able to overgraze and form ‘barren’ habitat that is unable to support abalone, rock lobster and scalefish fisheries. The species has spread along the full extent of the east coast where barrens are steadily increasing, and now occurs on the south and west coasts. Scientific evidence suggests that there is a significant threat to the integrity of rocky reef ecosystems and the fisheries they support.

Research has also focused on the role of rock lobsters as a predator of the *Centrostephanus*. Large rock lobsters (>130mm CL) appear to be a key predator.

A workshop was convened in December 2005 to consider knowledge, research and management of this urchin species. Workshop participants included industry representatives from abalone, rock lobsters and commercial dive sectors, recreational fishers, researchers, and managers. Recommendations from the workshop included strategies for further monitoring, establishment of a working group to develop strategic planning and development of a research proposal to experimentally investigate various management options.

These recommendations have been progressed and a significant research proposal has recently been submitted to FRDC for funding consideration. The planned outcomes of the project are to provide solid scientific evaluation of management options to assist managers in the development of policy and cost effective measures to mitigate the effect of *Centrostephanus* overgrazing in Tasmania.

Ecosystem effects of fishing are also being investigated through a major FRDC funded research project: *Towards an integrated multi-species management of Australia’s south-east reef fisheries: a Tasmanian example*. More information on this project is detailed in the Research and Monitoring section of this report.

In 2004, the peak industry body representing rock lobster and giant crab fishers the Tasmanian Rock Lobster Fishermen’s Association (TRLFA), began actively promoting the adoption of a program called the “Clean Green Program”. This program is an environmental management system, which is certified and conforms to nationally recognised JAS-ANZ and ISO/IEC standards. The program is a pot-to-plate initiative with standards of best practice covering environmental practice, seafood safety and quality and occupational health and safety. The standards have been developed by industry, for industry, to meet developing market, community and government expectations/legislation in environmental management. Performance against all criteria is audited independently.

The program was developed by Southern Rocklobster Limited, a company formed by the South Australian, Tasmanian and Victorian Rock Lobster Industry Associations. The company recently won the environmental best practice program award at the United Nations Association of Australia’s 2005 World Environment Day Awards.

The environmental practice covered by the program includes fishery sustainability, minimising bycatch, minimising ecological interactions, avoiding seal breeding colonies, whale identification, introduced pests, waste disposal procedures, safe refuelling and spill kit use.

To be accredited, fishers must attend a two day structured induction and assessment program. Southern Rocklobster Limited runs this program on a port by port basis. Independent auditing of the skipper and vessels occurs randomly every year. To date (November 2006) 39 Tasmanian rock lobster fishers have been accredited and another 15 fishers have completed the latest induction course.

DPIW has actively supported the adoption of this program by financial support through the FarmBis initiative, which the Department administers in Tasmania, and through administrative support such as providing venues free of charge to run part of the induction progress.

8. Progress in implementing DEH recommendations

8.1 Recommendation 1

A dialogue should commence between all fisheries jurisdictions managing Jasus edwardsii to ensure that a) management arrangements are complementary in the sense that minimum levels of egg production and biomass are protected; b) the activities in each jurisdiction that are likely to impact on the fishery in another jurisdiction are explicitly taken into account in stock assessments and in devising the management triggers and responses for individual jurisdictions; and c) if feasible, working towards joint stock assessment would be a significant step towards harmonising management arrangements.

Recently, DPIW initiated a meeting of rock lobster fishery managers and principal researchers from the three jurisdictions to provide an opportunity for dialogue on a number of issues of common interest. This recommendation was discussed. The group noted that since the 2001 assessment of the Tasmanian rock lobster fishery, the Victoria and South Australian rock lobster fisheries have been assessed by DEH and accredited under the EPBC Act (refer to table 7 for a summary of reference points for each State). This implicitly suggests that the role of dialogue between jurisdictions in relation to “ensuring” minimum levels of egg production and biomass are protected in each jurisdiction has significantly diminished in value.

Table 7: Summary of reference points/performance measures for each State

	Tasmania	Victoria	South Australia
Minimum egg production			
Limit reference point	Reference year	75% probability of being >20% B ₁₉₅₁	Reference year Catch rates and pre-recruit index
Target	25% of estimated virgin egg production in each assessment region	50% probability of being at 40% of B ₁₉₅₁	<ul style="list-style-type: none"> Biomass and egg production estimates as indicators

			<ul style="list-style-type: none"> • Stock assessment model is under significant modification
Minimum biomass	Biomass & catch rates - reference year Discussing biomass target MSY & MEY	75% probability of being >20% of B_{1951} Available biomass - economic indicator	Developing decision rules - and other performance measures

The group did not believe there were any activities that might occur in South Australia that would be relevant to the Tasmanian stock assessment. Unloading of Tasmanian rock lobster at specified Victorian ports was identified as the only activity of relevance between these two states. This activity has a stringent monitoring/compliance regime. Unloading of Victorian rock lobster in Tasmanian ports is not permitted.

Over the last five years a number of collaborative research projects have been undertaken between TAFI (TAS), SARDI (SA) and MAFRI (VIC).

These include:

- 1) FRDC - Larval transport and recruitment processes of southern rock lobster;
- 2) FRDC - Can production in the southern rock lobster fishery be improved? Linking juvenile growth, survival and density dependence to sustainable yield;
- 3) FRDC 2006/220: “Spatial management of southern rock lobster fisheries to improve yield, value and sustainability.”

Regular meetings have also been held through other projects including:

- 4) RLPHS - Quantification of shell hardness in southern rock lobster.

The group concluded that the recommended joint stock assessments are not practical or feasible as management systems differ. This means that fleet dynamics models in projections cannot interact. In Tasmania, the biology of lobsters varies so much that we assess the biological state of stocks on as small an area as possible (8 regions in Tasmania). These areas are connected by (a) movement of larvae (biological) and (b) movement of the fleet (fleet dynamics). Tasmania interacts with other states already on biological issues linking regions such as larval transport issues – as demonstrated in projects above. However, it makes no sense to combine our fleet dynamic components, as vessels cannot change jurisdiction (eg if catches are high in Victoria, but low in Tasmania a fisher cannot shift effort). Each jurisdiction also noted a common trend of assessments focusing on the stocks at a finer spatial scale than in the past.

However, the group agreed that there would be benefits in working towards the collection of similar data for assessments, and standardising model databases, which would facilitate data sharing between the jurisdictions in the future.

8.2 Recommendation 2

The compliance and enforcement strategy should be periodically reviewed to ensure emerging compliance risks are identified and addressed.

The Fisheries Monitoring and Quota Audit Unit in the Department gathers and records catch and effort data as well as quota management and reporting data and intelligence for fisheries compliance to ensure the integrity of quota management. Analysis of the data in the computer based systems for licensing and quota management is used to detect quota avoidance and to identify licence holders, processors and handlers for more thorough investigation and audit.

A proportion of licence fees collected each year is directed to Tasmania Police to support the field based operations of policing the fisheries legislation. There is on going liaison on a regular basis between Tasmania Police and Marine Resources staff to discuss compliance and operational issues, and the progress of prosecutions. Marine Resources staff also ensure that adequate resources are being directed to fisheries policing in the field.

Emerging issues are addressed as they arise on ongoing basis.

Annual Marine Police statistics indicate a high level of compliance with respect to few major breaches by the commercial sector.

As part of the review of the rock lobster fishery legislation in 2005, both the Tasmania Police and Fisheries Monitoring and Quota Audit Unit conducted a “rule by rule review” of the legislation and provided a detailed list amendments, deletions and new rules to be included in the new management plan.

8.3 Recommendation 3

Representation in the fishery assessment process should be increased to strengthen representation from conservation or community interests. Consideration should also be given to broader public notification of the potential to input into the assessment process. The existing stock assessment process would be further strengthened by periodic external peer review.

A stock assessment working group meets annually to provide feedback to research staff on the presentation and analysis presented in the draft stock assessment. Representation was broadened in 2002 to include recreational fishers from the Recreational Fisheries Advisory Committee (RecFAC) and the community and conservation representative from CFAC and RecFAC.

Broader public notification of the potential to input into the assessment process is not considered appropriate or feasible. The stock assessment document is a plain English report on the scientific assessment of status of the stocks, using fishery dependent and independent data and outputs from a stock assessment. Feedback from commercial and recreational fishing representatives is useful to provide views on different factors that may be contributing to trends in catch rates for example.

The current stock assessment document is designed to inform managers and fishers of the status of the stocks and reports against a number of management objectives and performance indicators. Discussions are currently underway between DPIW and TAFI to review the structure of the document with a view to producing a simpler and

more succinct annual status report and periodically draft a more detailed scientific technical report that included detailed scientific methodology and would be suitable for external peer review.

8.4 Recommendation 4

DPIWE should continue to monitor the situation with respect to the harvest of immature females in the northern part of the fishery to ensure any reductions in egg production or puerulus settlement are detected in a timely manner and develop a management response for implementation in the event that a major issue develops.

TAFI continues to monitor egg production in the north of the State. This is through model estimates of egg production based on commercial catch rates and research catch sampling. Regional importance of egg production sources is under investigation through an FRDC project on larval dispersal, which has recently been completed. Puerulus settlement continues to be monitored on the east coast. However, egg production and puerulus settlement in this area are decoupled through the large larval dispersal and the biological processes that have masked any stock-recruit relationship to date.

In the 2004/05 stock assessment, TAFI notes that all four northern areas have shown improved levels of egg production relative to the reference years. Three of the four northern assessment regions have levels of egg production that are just below the target reference point of 25% of estimated virgin production. The north west region is of concern because whilst relatively stable, estimates are low and appear unlikely to increase above the 25% target level in future projections under the current management arrangements.

Results from the FRDC larval dispersal project, (Bruce *et al* 2006) suggest that larval settlement in the northwest region is strongly influenced by larvae originating from South Australia. Self-recruitment back to the region of origin is also significant. The model results also indicate that a significant proportion of larvae originating from the northwest are lost in Bass Strait and are not an important contributor to other regions of the Tasmanian fishery.

However, from a precautionary perspective DPIW believes there would be benefits in developing long term strategies to increase levels of egg production in this region and that the 25% target is appropriate.

A number of potential management strategies have been discussed, with both the recreational and commercial sectors, as part of the consultation process during the review of the management plan. A discussion paper on the benefits of considering alternative size limits was circulated to all commercial fishers and discussed during the annual series of port meetings in May 2006. The next stage in this development process is to draft a specific proposal for discussion by industry in May 2007. Recently CFAC has also supported the development of a rule to prohibit the possession of immature but legal size female rock lobster. Due to the fast growth rates in the northern regions, a proportion of females reach legal size before reaching maturity, these lobster have distinctive physical characteristics which should enable fishers to immediately return these lobsters to the sea.

Analysis and modelling of the impact of alternative size limits on rock lobster stocks is a component of the FRDC spatial management project, which has just commenced.

8.5 Recommendation 5

In the event that a review is triggered by a breach of the performance measures the management plan should require that action must be taken to return the fishery to a stage where it will satisfy the management objectives if the review establishes that the management regime is under-performing.

The objectives relating to the sustainability of the rock lobster resource in the fisheries policy document are complementary to the stated resource management and planning objectives described in Schedule 1 of the *Living Marine Resource Management Act 1995*. The performance of the management plan in meeting its objectives is measured through a combination of performance indicators concerning the sustainability of the rock lobster resource, the level of bycatch and any impact with threatened or endangered species. Trigger points are levels of, or rates of change in, the performance indicators that are considered to be too low or outside the normal variation of the stocks and the fishery. When one or more of the trigger points are breached, the policy document requires that the circumstances relating to the trigger being breached are to be investigated and, if necessary, a review of the management of the rock lobster fishery should be recommended to the Minister.

During the period since the last assessment, only one trigger has been activated (2004/05). This was the trigger relating to relative abundance of undersize lobster. *Annual CPUE of undersized lobster in the pre-recruit size class falls below 95% of that estimated for the reference year (1995), for the same sampling Area and sampling period.*

The assessment notes that the analysis of this trigger point should consider mitigating factors such as variations in catchability due to weather or variations in moult timing. The Tasmanian rock lobster stock assessment working group considered this trigger point to be of questionable value, given the large annual variation in natural recruitment. It was suggested that future management plans incorporate a trigger based on trends in relative abundance of undersize lobsters over periods of several years.

For the abundance of pre-recruit lobsters (undersized lobster equivalent to one growth increment below legal size) to be useful as a performance indicator, a relationship between the catch rate of undersized and newly recruited legal-sized lobsters needs to be established. A link between the abundance of undersized lobsters and subsequent legal-sized lobsters has only been defined for the south coast where catch rates of undersized males between 102-110 mm CL provide an imprecise index of animals moulting to legal-sized in the following season.

Catch rates of undersized lobsters at Maatsuyker Island in 2004 decreased by 48% from 2003 catch rates and by 42% from the reference year (1995) (Table 10). However, combined Maatsuyker Island/Port Davey catch rates show an 88% increase from 2003, with no matching data available for the reference year. This provides an indication of the volatility of this data set and suggests that short term declines may be of limited concern.

DPIW did not consider that a management response was warranted.

8.6 Recommendation 6

Stock assessment processes should Incorporate, if not already done, a risk assessment into the ecological impact of the potential skew in sex ratio caused by a longer fishing season on males, with a view to developing appropriate management arrangements (triggers and responses) should the skew in sex ratio present a sustainability issue.

TAFI monitors sex ratios at a number of locations around the State. There is no evidence that ecological impacts are likely to be sex-linked per se, however, fishery impacts in terms of regional egg production continues to be monitored around the State. It appears that the longer fishing season for males has a smaller impact on sex ratios than differences in growth rate and thus protection through the minimum size limit. This supports the current approach to the monitoring of skew in sex ratio on a regional basis, as per growth and egg production.

8.7 Recommendation 7

DPIWE should develop and provide, as part of the public review process for the management arrangements for the Tasmanian rock lobster fishery in 2005, an assessment of the options for system-based management objectives and associated biological reference, target and limit levels and performance measures for application in the fishery.

Prior to the 2005 review, DPIW identified that insufficient resources were available to properly review and develop where necessary, new options as suggested in this recommendation. The 2005 review information paper (Anon DPIWE 2005) states that development of a new strategic policy document for the fishery is a high priority. The development process has commenced in 2006. The relevant advisory committees have provided feedback on draft objectives and strategies for the fishery. In addition, TAFI have commenced a review of biological reference, target and limit levels and performance measures. There is still a significant amount of development work with the advisory committees prior to wider public consultation on the draft document. DPIW anticipates that public consultation will occur in mid 2007 and is hopeful that new performance measures can be applied to the 2006/07 stock assessment.

8.8 Recommendation 8

An analysis of measures to encourage the accuracy of byproduct reporting should be conducted with a view to improving data collection, assessment and management responses.

Fishery independent data has been collected through a specific bycatch research project that commenced in 2003 (more details under Recommendation 9).

Development of options to improve fishery dependent data collection commenced this year. Currently rock lobster fishers record catch and effort details of retained bycatch (byproduct) in the General Fishing catch effort logbook. CFAC has supported progressing an option to amend the rock lobster catch effort logbook to incorporate by product data. The advantages of this option include;

- Daily reporting instead of monthly → high accuracy
- Only one catch effort logbook to complete
- No duplication of fishing operations information in two logbooks
- Very simple design → have a tick box on the catch & effort page with detail on a separate page (similar to protected species)

Implementation of the new reporting system together with a fisher information program to highlight the importance of accurate byproduct reporting is planned for March 2007, subject to IT resources being available to alter the DPIW database systems.

Byproduct data from the rock lobster fishery will continue to be incorporated into relevant species stock assessment processes.

Development of appropriate performance measures and indicators as identified through the outcomes of the Tri-State risk assessment workshop detailed below, will be incorporated in the new strategic policy document for the fishery.

8.9 Recommendation 9

Mechanisms should be developed to ensure better recording of bycatch in the fishery. A more formal assessment of the risks posed to bycatch species should be carried out before the next assessment to confirm assumptions relating to low risk of having a significant impact on species making up the bycatch for this fishery. Risk assessments could include the vulnerability of various bycatch species; a qualitative assessment on survivorship of animals returned to the water; and identification of areas or times of high bycatch incidence.

TAFI commenced a new bycatch data collection project in 2003. The research bycatch data provides an assessment of bycatch species, an average number per pot and the impact of escape gaps on different bycatch species (Wernstrom and Frusher 2006). This project follows on from the earlier work of Frusher and Gibson (1999) and also compliments an 11 year ongoing fishery independent project that has, as a component of the project, recorded bycatch from research pots without escape gaps.

The 2004/05 assessment reports that catch sampling continued in October 2004, and similarly to 2003, 78% of all bycatch recorded in the surveys were hermit crabs (*cf* 80% in 2003). The incidence of other bycatch species by comparison was scarce. This observation program will continue during 2005/06 to assist in documenting the impact of escape gaps on the fishery.

Preliminary results from this project were presented at a recent workshop. The Tri-State (Tas, SA Vic) rock lobster bycatch risk assessment workshop was facilitated by DPIW/TAFI in October 2006. The draft report is still in preparation. The workshop participants included the rock lobster managers and researchers from each State and the conservation representative from the Victorian commercial rock lobster and giant crab committee.

The workshop considered the bycatch data collected by each State and undertook a risk assessment of the impact of rock lobster fishing on all known bycatch species. The main outcomes are summarised in Table 8.

Table 8: Risk assessment of the impact of rock lobster fishing on all known bycatch species for Tasmania, South Australia and Victoria from the Tri-State rock lobster fishery bycatch workshop, October 2006.

Significant Retained species	Risk of rock lobster fishing impacting on bycatch species population
Octopus	Low - moderate
Blue throat wrasse	Low - high
Other wrasse species	Low - moderate
Leather jacket species	Low - high
Non retained species	
Blue Throat wrasse	Low - moderate
Other wrasse species	Low
leatherjacket species	Low - moderate
All other species	Negligible

The wide risk ratings recorded are a function of the uncertainty about the status of the key bycatch species populations and lack of data on bycatch population distribution by depth. Relevant information from scalefish assessments will be included in the final report.

Potential management actions identified at the workshop include:

Where the risk ranking was moderate:

- Improve fisher byproduct reporting
- Improve confidence in the fishery dependent data
- Temporal trends (through existing fishery independent data collection)

Continue to ensure that rock lobster fishery bycatch is included within relevant fishery assessments. This is particularly where the bycatch from the lobster fishery is estimated to be significant compared with the total catch of the species and where there is uncertainty about the status of byproduct species stock.

Use the types of performance measures described in the Victorian rock lobster fishery ecological risk assessment report (Jenkins *et al* 2005) as these appear to be a sensible approach for the top four bycatch species (Octopus, Blue-throat wrasse, all leatherjacket species, and other wrasse species).

Use of statistical control plots for plotting trends through time. There is potential to set performance indicators using this process.

Knowledge gap - data on highgrade discards (voluntary data recording similar to SA – estimate by weight)

As noted in previous section, the development of appropriate performance measures and indicators as identified through the outcomes the workshop will be incorporated in the new strategic policy document for the fishery.

8.10 Recommendation 10

A structured reporting and monitoring program into interactions with protected species should be developed as high priority. If this program suggests interactions occur more frequently than previously thought, mitigation measures, including trigger and reference points, should be introduced to reduce interactions. DPIWE are strongly encouraged to investigate the use of seal spikes or other appropriate as a precautionary measure.

A new reporting system was introduced into commercial catch effort logbooks at the end of the 2002/03 quota year. As discussed in earlier in the report (interactions with protected species section), the reporting system consists of a tick box on the rock lobster catch effort daily logsheet to indicate if an interaction has occurred. The fisher must then complete a protected species interaction form (Figure 4) to provide more information, which is located at the back of the log book.

Vessel Name	Distinguishing Mark
Date	Block No.
Night/Day Shot	
Species	
Seal <input type="checkbox"/>	Dolphin <input type="checkbox"/>
Seabird <input type="checkbox"/>	Whale <input type="checkbox"/>
Turtle <input type="checkbox"/>	Other <input type="checkbox"/>
<div style="border: 1px solid black; width: 150px; height: 20px; display: inline-block;"></div>	

Type or common name (if known) <input type="text"/>	
Was the interaction with your?	Fishing gear (eg pot, bait, vessel) <input type="checkbox"/> Catch <input type="checkbox"/>
	Discarded catch <input type="checkbox"/>
When you first observed the protected species was it?	Alive <input type="checkbox"/> Dead <input type="checkbox"/>
	Injured <input type="checkbox"/>
Any other comments	

Figure 4: Protected species interaction form extracted from the Tasmanian commercial rock lobster fishery catch and effort logbook.

Fishers are required to return forms on a monthly basis with their catch and effort logsheets. The data is collated by DPIW and provided to TAFI for analysis.

The incidence of reported negative interactions appears to be very low, although improvements in the level of reported detail would be of benefit, as discussed previously. The development of mitigation measures as suggested in the recommendation does not appear warranted to date.

In 2002 a seal/fishery interaction management strategy background report (Anonymous, DPIWE, 2002) noted that the extent of seal interaction with rock lobster fishing gear is difficult to assess but likely to be small. The most frequently reported interactions included pulling bait out of savers, predation or damage to undersize rock lobsters while being released. Fishers reported that improvements in the way that bait is secured in pots has reduced bait loss. The risk of pup seals being caught in pots where they could drown was given a low risk rating by the technical working group assessing fishing risk for Commonwealth marine protected areas. To date DPIW does not consider the risk warrants the resources needed to develop and trial seal exclusion devices. A rule, which effectively prohibited the use of seal spikes, was removed from the new management plan. This legislative change could facilitate fishers trialling exclusion devices in the future if required.

8.11 Recommendation 11

DPIWE should establish a program monitoring fished and unfished areas in the fishery with a view to identifying changes in the wider marine environment which may be a result of the fishery.

Unfished areas have now been in existence for a decade and have been surveyed regularly throughout this period. Statistically significant differences in the abundance and size-structure of unfished populations of rock lobster have developed over time. The abundance of some other species has also altered. Monitoring of these sites continues.

Research relating to this recommendation is reported in the rock lobster assessment reports 2001/02, 2002/03, 2003/04 and 2004/05.

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