

**West Coast Rock Lobster Fishery
Ecological Risk Assessment
20 February 2013**

Prepared for the Western Australian
Department of Fisheries.
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Department of **Fisheries**

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Executive Summary

An ecological risk assessment (ERA) of the Western Rock Lobster (WRL) was undertaken in February 2013 in support of Marine Stewardship Council (MSC) re-certification of the commercial West Coast Rock Lobster Fishery. The starting point for this 2013 ERA was the previous ERA undertaken to support MSC certification in 2006 (DoF 2007). Prior to 2007, ERAs were undertaken for the fishery in 2000 and 2005.

The workshop procedure was developed in consultation with the Department of Fisheries Western Australia (DoF), based on the methodology published by Fletcher et al. (2002). Consequence and likelihood ratings for ecological components were adopted from DoF standards being applied to all fisheries in Western Australia (Dr Rick Fletcher, personal communication).

The workshop procedure (Stoklosa 2013) and Terms of Reference and Background Documents (DoF 2013) were distributed widely to all stakeholders in January 2013 whilst canvassing the availability of independent experts for proposed workshop dates. Numerous technical documents to support the ERA were identified in the Terms of Reference and Background Documents, with web links to their full contents.

The ERA, undertaken on 20 February 2013, resulted in detailed outcomes which were documented in the risk assessment workshop record and communicated to all participants. All of the threats on the agenda were assessed using a consultative and structured workshop procedure. Consensus was reached on the expert judgements of a Technical Panel in this qualitative ERA.

All of the threats were ranked low or negligible risk under present circumstances. As such, no specific management response is required to reduce the risk ranking of these threats. However, some sensible and cost-effective risk treatment measures have been suggested to further reduce risk, as advice to DoF and the WRL fishing industry for consideration.

Ongoing performance monitoring of the fishery should confirm that these risks remain negligible to low. In the event that circumstances of the fishery change or performance monitoring detects an unexpected change, the relevant threats should be re-assessed.

Introduction

The Western Australian Rock Lobster (*Panulirus cygnus*) fishery¹ was the first in the world to gain certification as a ‘well-managed and sustainable fishery’ by the Marine Stewardship Council (MSC) in 2000. It has since been re-certified twice, in 2006 and 2012.² Continued certification relies, in part, on ecological risk assessment (ERA) of the interactions of fishing activities with the structure, productivity, function and diversity of the ecosystem—supporting MSC Principle 2.

The Western Australian Department of Fisheries (DoF) engaged E-Systems Pty Limited to undertake preparations for and facilitate the required ERA. Mr Richard Stoklosa of E-Systems was previously engaged by DoF to prepare for and facilitate the previous ERA for this fishery in 2007 (DoF 2007).

This document is the report of the 20 February 2013 Western Rock Lobster ERA, prepared by Richard Stoklosa of E-Systems on behalf of the Western Australian Department of Fisheries. The expected outcome of this 2013 ERA was to provide transparent and confident classification of risks associated with the activities of the Western Rock Lobster fishery, and to assist with the identification of management strategies to control risk where necessary.

Selection of the assessment method

The DoF has adopted the risk analysis methodology of Fletcher et al. (2002), with some clarifications to the ratings of consequences and likelihood, and ranking of risk (Fletcher, personal communication). It is the policy of DoF that the adopted risk analysis methodology is consistently used across all fishery assessments in Western Australia. E-Systems developed an ERA Workshop Procedure (Stoklosa 2013) incorporating the adopted DoF risk analysis methodology and the approach used in the previous ERA of the Western Rock Lobster fishery (Stoklosa 2007).

The Workshop Procedure and Terms of Reference and Background Documents (DoF 2013) were distributed widely to all stakeholders in January 2013 whilst canvassing the availability of independent experts for proposed workshop dates. The Terms of Reference and Background Documents included web links to numerous technical reports, to identify the information available to support the ERA.

¹ The commercial fishery is officially referred to as the ‘West Coast Rock Lobster Fishery’.

² <http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/south-atlantic-indian-ocean/western-australia-rock-lobster/western-australia-rock-lobster> .

The Western Australian Rock Lobster fishery³

Target species

The Western Rock Lobster occurs off the western coast of Australia, with the post-larval stages inhabiting the continental shelf from 1 to 200 meters in depth. The highest densities occur in waters less than 60 m in depth (Kailola et al. 1993).

The species, *Panulirus cygnus*, is a spiny lobster with long antennae. The anterodorsal aspect of the carapace bears two distinct, smooth supraorbital spines and behind them are two rows of 4–8 smaller spines. Each abdominal segment has a transverse groove. The older juveniles and adult lobsters (except migratory 'whites') assume a reddish-purple colour with each moult. The carapace is uniformly coloured without obvious spots and markings, although the abdomen is spotted dorsally and laterally. Each walking leg has a broad, pale longitudinal stripe on its dorsal surface.

Life history⁴

The life cycle of the western rock lobster includes a long (approximately nine to eleven month) oceanic larval phase during which mortality is high especially during El Niño events. Hatching of eggs occurs in summer (mostly November to January) on the outer continental shelf. The larvae disperse up to 1500 km offshore spending the better part of the year in the South-eastern Indian Ocean. The larvae then return to the continental shelf from about July onwards and metamorphose into the final 'puerulus' larval stage which moves onshore and settles in shallow reefs in less than 30m of water (Kailola et al. 1993; Phillips and Pearce 1997). Juveniles remain on shallow coastal reefs for three to six years before recruiting to the fishery (Phillips et al. 1991).

Adults mate between July and December and females carry the spermatophores until eggs are spawned between August and January. Depending upon the female's size, 100,000 to 1 million eggs are spawned. These eggs are carried on the underside of the female's abdomen until hatched, which may take up to ten weeks depending on the water temperature.

The size at which lobsters reach sexual maturity has been assessed only for females and varies with location and growth rate. Generally females are sexually mature at approximately five to six years of age, when their carapace length measures 90–95 mm. The sex ratio is usually 1:1.

Growth rates vary considerably along the coast. In general, pueruli settle at approximately 8 mm carapace length. The pueruli grow to become juvenile rock lobsters through a series of moults. These juveniles feed and grow on the shallow onshore reefs for the next three or four years.

At this point, the lobsters undergo a synchronised moult in late spring. They change their normal red shell colour to a creamy-white/pale pink. The lobsters are then known as 'whites', until they return to their normal red colour at the next moult a few months later. The whites' phase is a migratory phase. Once their new lighter-coloured shell has hardened, they set out on a two-pronged migration. Most head west and undergo a mass migration into deeper water, where they resettle on deeper reefs. A smaller percentage makes a longer migration to the north, usually

³ Update provided by Mr Rhys Brown, Department of Fisheries Western Australia.

⁴ More information on the life history and other links for rock lobster can be found at <http://www.fish.wa.gov.au/Species/Rock-Lobster/Pages/default.aspx>

following the continental shelf. In large groups, the lobsters trek at night, until they reach the spawning grounds, occasionally a hundred or more kilometres away from where they started and in water up to 100 m deep.

P. cygnus are omnivorous and feed at night. Their diet changes according to moult stage, season and habitat. Post-moult lobsters prefer epiphytic coralline algae (eg. *Corallina* species, *Metagonolithon* species) and inter-moult forms prefer molluscan items. Adults eat similar but larger food to that of juveniles (eg. epiphytic coralline algae, molluscs, small crustaceans, polychaete worms and sipunculids).

Predators include, but are not limited to, reef fish, sharks and octopus (*Octopus* species).

Fishery description

The commercial fishery for western rock lobster is the most valuable single species wild capture fishery in Australia, with a long term average catch of about 11,000 tonnes (t), worth between \$A200 and \$A400 million annually and usually represents about 20 percent of the total value of Australia's fisheries. The total allowable catch (TACC) taken in 2011/13 was 6,647 tonnes for an extended 14 month fishing season between 15 November 2011 and 14 January 2013 (closed season 1 October 2012 and 14 November 2012, see Attachment 1 for further details).

This fishery also supports a significant recreational fishery with an estimated 21,400 licences (57% of the total number of licences) being used to take 150 tonnes of rock lobster in 2010/11 (3% of the total catch). The license entitles fishers to use two pots and/or dive for rock lobster, and keep up to eight lobsters per day. There is a maximum of 4 pots and 16 lobsters per day per boat with two licensed fishers onboard.⁵

As one of the first managed fisheries in Western Australia, data have been kept on the Western Australia rock lobster fishery since the early 1900s. The rock lobster fishery was declared limited entry in March 1963 when license and pot numbers were frozen. Since 1963, boat numbers have declined from 836 to 297 in 2010/11.⁶ The commercial catch has varied between 5,500 and 14,500t over the last 20 years mostly due to natural fluctuations in annual recruitment. The settlement of puerulus (one year old lobsters) is used to predict recruitment levels, and therefore catches three to four years ahead. Puerulus recruitment to the fishery declined sharply in 2007/08, with extremely low recruitment occurring in 2008/09. Recruitment has since recovered, but is still well below average⁷.

In the 2013/14 season the management of the fishery moved to an individual transferable quota system. A TACC is divided between the three Zones of the fishery (A, B and C, see Figure 1). There are limits on the number of traps that can be used and restrictions that constrain their design and construction, including the requirement for escape gaps, which also play a significant role in controlling exploitation rates. Other management tools of note are those of a biological nature. Specifically, harvesting excludes females in breeding condition, and lobsters outside the limits of minimum and maximum carapace length. This package of controls ensures the

⁵ For further information on recreational lobster fishing rules see <http://www.fish.wa.gov.au/Species/Rock-Lobster/Pages/Lobster-Recreational-Fishing.aspx>

⁶ For further information on the commercial rock lobster fishery see <http://www.fish.wa.gov.au/Species/Rock-Lobster/Pages/Lobster-Commercial-Fishing.aspx>

⁷ Graphs showing the puerulus settlement can be found at <http://www.fish.wa.gov.au/Species/Rock-Lobster/Lobster-Management/Pages/Puerulus-Settlement-Index.aspx>

sustainability of the fishery, which is at the heart of the objectives of the State’s fisheries legislation. See *Summary of Recent Changes in the Fishery* below and Attachment 1 for details of the changes to the management controls between 2008/09 and 2013.

Western rock lobsters are distributed from Augusta on the South coast of Western Australia up to Exmouth, north of Shark Bay (Figure 1). The fishery is divided into three access zones (A, B and C), which helps to distribute effort across the fishery and enables management controls aimed at addressing zone specific issues. For example, there are currently different maximum size restrictions in the northern and southern regions of the fishery, and the Big Bank area (Figure 1) of the fishery has been closed since 2009 to protect its spawning stock. Smaller areas such as between Cape Leeuwin and Naturalist, Rottneest and Quobba Point are also closed to commercial fishing, and there are Fish Habitat Fish Protection Areas at Cottesloe, Yallingup and Lancelin Island. Other closed areas exist under the Marine Park management system administered by the Department of Environment and Conservation (DEC).

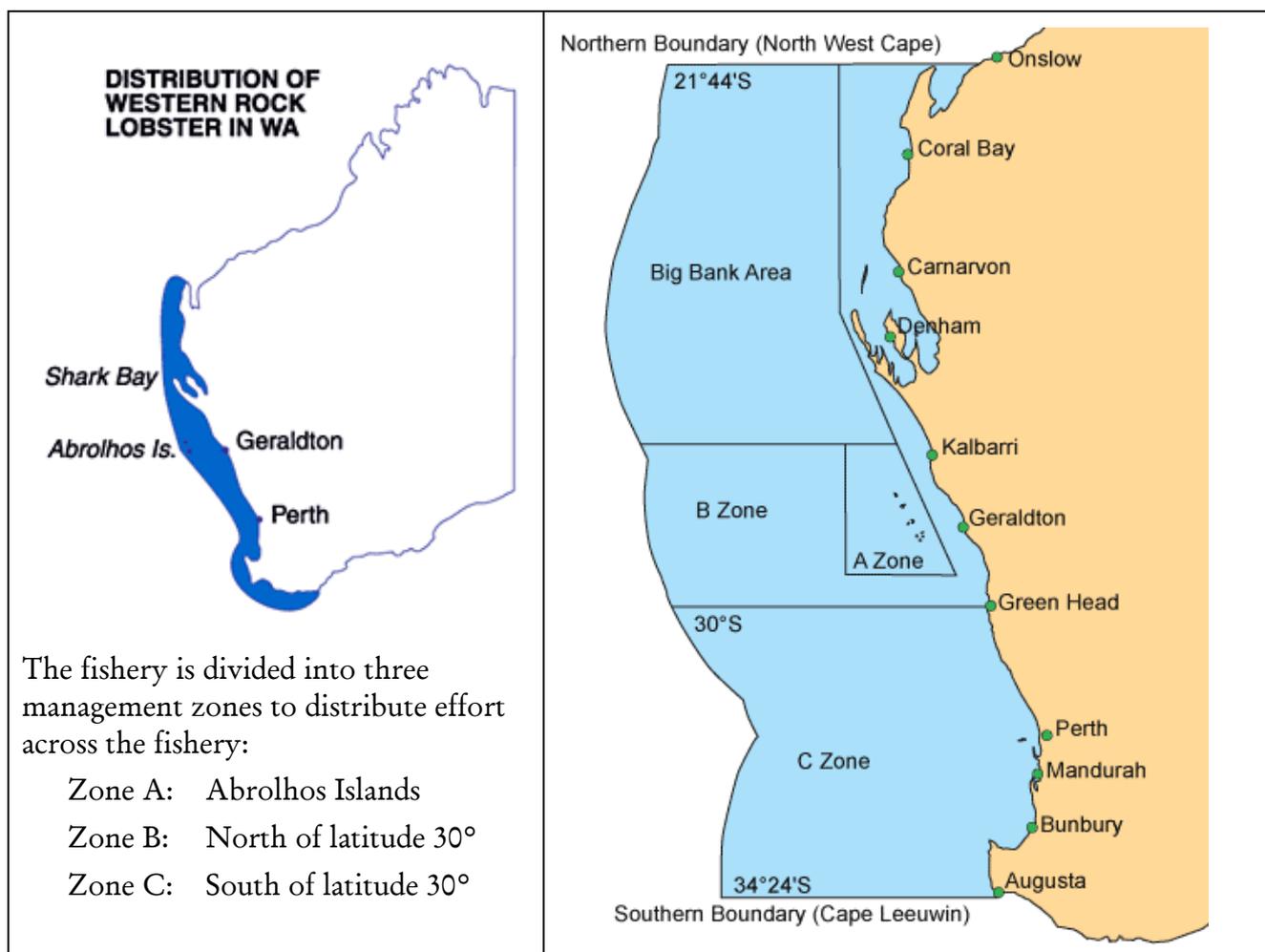


Figure 1. Distribution of Western rock lobster and lobster fishing zones in Western Australia.

System of Government in Western Australia and relevant fisheries legislation

The Government of Western Australia operates under the Westminster system, and an important tenant of this system is that the responsible Minister makes executive decisions. Insofar as the administration of fisheries in Western Australia is concerned the relevant executive decision maker is the Minister for Fisheries.

The Department of Fisheries (DoF) is established under the *Public Sector Management Act 1994* and is the department principally responsible for assisting the Minister for Fisheries in administering the following acts and regulations:

- Fish Resources Management Act 1994 (FRMA);
- Fish Resources Management Regulations 1995 (FRMR);
- Pearling Act 1990;
- Fisheries Adjustment Schemes Act 1987;
- Fishing and Related Industries Compensation (Marine Reserves) Act 1997; and
- Fishing Industry Promotion Training and Management Levy Act 1994.

Up to date versions of the legislation governing the Department of Fisheries and the Fisheries acts and regulations can be accessed via links at:

[http://www.fish.wa.gov.au/About-Us/Legislation/Western Australian Fisheries Legislation/Pages/default.aspx](http://www.fish.wa.gov.au/About-Us/Legislation/Western_Australian_Fisheries_Legislation/Pages/default.aspx).

An overview of the new FRMA and the objectives of sustainable fisheries and aquatic management policy and how they relate to national and international fisheries law and policy are published in *A Sea Change for Aquatic Sustainability – Meeting the Challenge of Fish Resource and Aquatic Sustainability in the 21st Century*, Fisheries Occasional Publication No. 79 at:

- <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx> and
- *Western Australian Government Fishery Policy Statement March 2012* at: http://www.fish.wa.gov.au/Documents/corporate_publications/wa_govt_fisheries_policy_statement.pdf.

Of particular relevance to the management of fish resources is the *Fish Resources Management Act 1994* (FRMA). Section 3 of the FRMA establishes that:

‘The objects of the Act are to conserve, develop and share the fish resources of the State for the benefit of present and future generations.’

The fish resources that fall under the jurisdiction of the FRMA are described in a formal agreement between the Commonwealth and State Governments—the Offshore Constitutional Settlement. This agreement and explanation of it is contained within *Fisheries Management Paper No.77—Offshore Constitutional Settlement 1995*.⁸

⁸ *Fisheries Management Paper No.77 – Offshore Constitutional Settlement 1995*, Fisheries Management Paper No. 77 at http://www.fish.wa.gov.au/Documents/pre-2010_publications/pre-2010_management_papers_and_reports.pdf

Under the FRMA, there is a division of power between the Minister for Fisheries and the statutory office of the Department of Fisheries Director General. In broad terms, it is the Minister for Fisheries who establishes the legal and policy framework for fisheries management, while the Director General (and staff) carries out the day-to-day administration of these frameworks.⁹

Source of Ministerial advice and consultation processes

To assist the Minister for Fisheries in managing the State's fish resources, the FRMA makes provision, under Part 4, for the establishment of advisory committees. Up until July 2010 the Rock Lobster Industry Advisory Committee (RLIAC)¹⁰ was the relevant advisory committee for the Western Australia rock lobster fishery resource, however, it (and its subcommittees) has since been wound up. Peak Bodies, advisory committees and tasked working groups now perform RLIAC's functions.¹¹ The Minister is not limited to seeking advice from formal advisory groups, committees, etc and can, for example, seek advice directly from stakeholders, the Department of Fisheries or Parliamentary colleagues.

Discussion with WRL fishery stakeholders occurs through a variety of forums, but regular and well-known features include stakeholder meetings held annually. In the past these meetings were known as the annual coastal tour, which was organised by RLIAC for around October each year. The coastal tour has recently been replaced by meetings coordinated by the Western Rock Lobster Council (WRLC) and DoF that can occur at any time during the year. The meetings are open to the public and usually take place at two or three major rock lobster ports between Fremantle and Geraldton. These meetings are widely recognized by rock lobster stakeholders as a mechanism for receiving the most up-to-date scientific advice on the status of the fishery and for discussing new and ongoing management issues.

Communication and engagement with stakeholders on such things as the annual stock assessment and management arrangements is through a variety of media:

- The rock lobster news letter, which is published approximately quarterly: <http://www.fish.wa.gov.au/Fishing-and-Aquaculture/Commercial-Fishing/Commercial-Fishing-Management/Pages/Industry-Notice-Board.aspx>.
- DoF publications (e.g. research and management) and discussion papers (published to obtain public comment) on the DoF website: <http://www.fish.wa.gov.au/About-Us/Publications/Pages/default.aspx>.

⁹ For information on the structure and function of the Department of Fisheries see <http://www.fish.wa.gov.au/About-Us/Pages/default.aspx>

¹⁰ For details on the history of RLIAC, its subcommittees and working groups see the Western Rock Lobster Environmental Management Strategy June 2002 - July 2006, Fisheries Occasional Publication No. 17 at: <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

¹¹ The Department has developed a flexible consultative process that focuses on peak body representation, such as the Western Australian Fishing Industry Council, Recfishwest, Western Rock Lobster Council, Conservation Council of WA, World Wildlife Fund, etc. For further details see *Report of the Consultation Working Group*, Fisheries Occasional Publications No. 73 at: http://www.fish.wa.gov.au/Documents/pre-2010_publications/pre-2010_fisheries_occasional_publications.pdf and *Western Australian Government Fishery Policy Statement March 2012* at http://www.fish.wa.gov.au/Documents/corporate_publications/wa_govt_fisheries_policy_statement.pdf

- Expert reference groups and scientific reviews/workshops, risk assessments and reviews, which are open to stakeholders. For example the Sea Lion Scientific Reference Group, the Effects of Fishing Advisory Group and specific expert workshops on stock assessment and modelling and the risk assessment of the causes of the low puerulus settlement. Independent expert based Ecological Risk Assessments are also undertaken at regular intervals or as new issues arise. The reports of the expert groups, workshops, risk assessments, and reviews are published on the Department of Fisheries of Fisheries WA website: <http://www.fish.wa.gov.au/About-Us/Publications/Pages/default.aspx>.
- Stakeholder meetings and accompanying background documentation and reports can be found at: <http://www.fish.wa.gov.au/Fishing-and-Aquaculture/Commercial-Fishing/Commercial-Fishing-Management/Pages/Industry-Notice-Board.aspx>.
- WRLC website (<http://www.rocklobsterwa.com/>) and Executive Officer.
- WAFIC website (<http://www.wafic.com.au/>).
- WAMSI website for ecological research (<http://www.wamsi.org.au>).

One of the purposes of these communication and consultation processes is to ensure stakeholders and the community more generally, have access to relevant information that shapes the advice that is provided to the Minister. Making information available and providing for a discussion and exchange of ideas encourages input from stakeholders and the community into the management process.

Figure 2 illustrates the separation of executive and administrative powers and responsibilities under the *Fish Resources Management Act 1994*. It also shows the over arching consultation system that applies to the management of Fisheries in Western Australia, which informs the Minister's decisions. Table 1 sets out the operating principles that have been agreed between the peak commercial fishing industry body (WAFIC), the Minister for Fisheries and the Department of Fisheries regarding the consultation process. DoF and WAFIC have negotiated a service level agreement that sets out in detail the consultation and decision making process that WAFIC and the WRLC will implement.

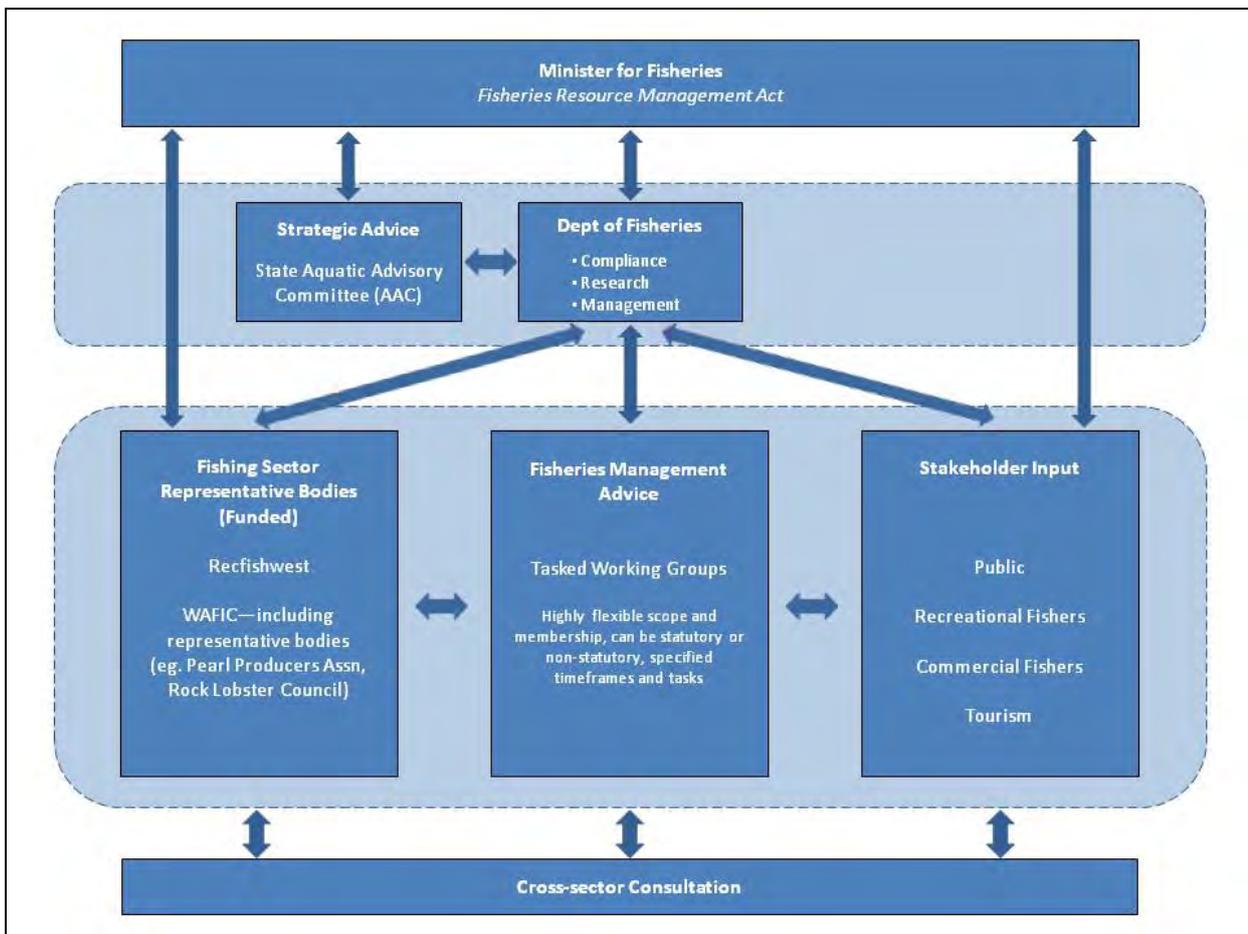


Figure 2. Overarching consultation and management framework for fisheries.

Table 1. Commercial fisheries consultation principles agreed by WAFIC and DoF.

Principle	Responsible association	Example
On generic policy issues which could affect, as a whole, the fishing, aquaculture, and pearling industries.	WAFIC.	Bioregional marine planning; safety, education and training; research and development policy and biosecurity.
On policy issues which currently primarily affect one sector but which could have implications for the broader industry.	WAFIC will nominate the relevant sector body and WAFIC and that body will jointly represent industry.	The Western Rock Lobster Council and WAFIC would represent industry on marina and port access issues which may primarily initially impact on the rock lobster industry in regard to certain locations but have precedents for the rest of the industry for other locations; the Pearl Producers' Association and WAFIC on animal welfare.
On issues which affect only one specific sector.	The relevant sector body would represent itself but WAFIC would be kept informed and may have a statutory consultation role. If no relevant sector body, WAFIC will assist in setting up appropriate consultative mechanisms.	Regulation of lobster pot design and quota setting negotiations (Western Rock Lobster Council); pearl promotion, (Pearl Producers' Association) e.g. Assisting the shark industry to establish the WA Demersal Gillnet & Longline Association and acting as Secretariat for interim period.

To provide additional non-legislative guidance for the operation of advisory groups and tasked working groups, scientific advisory committees, etc. the Minister for Fisheries issued *Fisheries Management Guide No.3—A guide for Management and Ministerial Advisory Committee (MACs) and the conduct of meetings issued by the Minister for Fisheries* as published in January 2003 by the Department of Fisheries.¹² This Guide covers all critical operational aspects for advisory committees. For example, the guide covers the role of members and observers, procedural matters, disclosure of interests and executive support for advisory committees.

Powers to manage the Western Rock Lobster Fishery

The Minister has legislative powers to turn knowledge and advice he is provided with into action. Parts 5 and 6 of the FRMA deal with the general regulation of fisheries through the use of orders and regulations and the specific management of fisheries via the declaration or creation/ amendment of fisheries management plans. Principally, the Minister for Fisheries manages the western rock lobster resource by exercising powers provided under Parts 5 and 6 of the FRMA after taking advice from stakeholders, advisory and scientific committees, tasked working groups and DoF. The administration of these arrangements then becomes the responsibility of the Director General and the Department of Fisheries more generally.

For the western rock lobster resource there is a fisheries management plan determined by the Minister for Fisheries that limits the right to fish commercially for western rock lobster to those who hold an appropriate licence issued only by the Director General. The management plan establishes the area and sub areas (zones) of the fishery, the capacity, permissible gear type, open and closed seasons and rules for transferring licences or parts of licences. The management plan for the West Coast Rock Lobster Fishery can be viewed by following the links:

- [http://www.fish.wa.gov.au/About-Us/Legislation/Western Australian Fisheries Legislation/Pages/default.aspx](http://www.fish.wa.gov.au/About-Us/Legislation/Western_Australian_Fisheries_Legislation/Pages/default.aspx); and
- amendments made to it in March 2011 are available at: [http://www.slp.wa.gov.au/gazette/GAZETTE.NSF/gazlist/C988A0D2E3504A7E4825784F000E404E/\\$file/gg035.pdf](http://www.slp.wa.gov.au/gazette/GAZETTE.NSF/gazlist/C988A0D2E3504A7E4825784F000E404E/$file/gg035.pdf).

In addition to the management plan there are orders determined by the Minister that (amongst other things) manage access to special areas within the overall boundaries of the fishery. For example there is an order that generally prohibits commercial fishing in waters immediately surrounding Rottnest Island off the Perth metropolitan coast.

To complement the management plan and various orders there is a body of regulations approved by the Minister and determined by the Governor of WA that apply specifically to western rock lobsters. In particular these regulations deal with the specifics of the sizes of lobsters that cannot be taken, the protection of lobsters in breeding condition, the dimensions of approved rock lobster fishing gear, bait types that cannot be used, and the requirement to hold a recreational fishing license to fish recreationally.

¹² Available from the DoF Library at 39 Northside Drive, Hillarys, PO Box 20 North Beach 6020.

The collection of orders and regulations are available online at:

[http://www.fish.wa.gov.au/About-Us/Legislation/Western Australian Fisheries Legislation/Pages/default.aspx](http://www.fish.wa.gov.au/About-Us/Legislation/Western_Australian_Fisheries_Legislation/Pages/default.aspx).

To assist Stakeholders (e.g. peak bodies), advisory committees, tasked working groups, etc in developing management advice for the Minister, a fisheries management harvest strategy and decision rules framework for the western rock lobster fishery was developed as a discussion paper soon after the fishery moved to an input ('quota') management system (see *West Coast Rock Lobster Managed Fishery Harvest Strategy and Decision Rules Framework Proposals Under a Quota Management System. A Discussion Paper*. Fisheries Management Paper No. 254:

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

Having received public comment on the discussion paper, DoF is currently redrafting it for another round of public comment before it is finalised.

Other resources for information regarding the biology and ecology of the western rock lobster and the fishery and its management may be found at:

Western Australian Department of Fisheries <http://www.fish.wa.gov.au/Species/Rock-Lobster/Pages/default.aspx>, accessed 3 April 2013.

Western Australian Fishing Industry Council Inc. <http://www.wafic.org.au/lobster>, accessed 3 April 2013.

Western Rock Lobster Council <http://www.wrlc.com.au/>, accessed 3 April 2013.

Recfishwest <http://recfishwest.org.au/> accessed 3 April 20103

Commonwealth Government Department of Sustainability, Environment Water, Population and Community <http://www.environment.gov.au/coasts/fisheries/wa/rocklob/index.html>, accessed 3 April 2013.

Source of funds to resource the management process

The costs of managing the Western Australia Rock Lobster Fishery, including conducting research, are met from a variety of sources. In particular significant contributions come each financial year from the:

- West Coast Rock Lobster industry,
- State Government Consolidated Revenue,
- Fisheries Research and Development Corporation,
- Industry Development Unit,
- Australian Seafood Cooperative Research Centre,
- National Heritage Trust,
- Western Australian Marine Science Institution, and
- Australian Research Council linkage grants.

Summary of recent changes in the fishery

A high level of fisheries management, compliance and research has been maintained in the fishery since the ERA in April 2007. In particular, a number of management arrangements that are relevant to the current ERA (February 2013) have been implemented to ensure sustainable fisheries management into the future. These include the legislated management changes that have occurred in the last three years in response to low puerulus settlements¹³ (refer to Attachment 1). The majority of these changes involved fishing effort reductions, including several reductions in unit values (pot numbers) and introductions of temporal and spatial closures. Fishing effort has been significantly lower in all seasons post-2007/08. However, increases in the length of the season in the past two seasons have caused a change in the distribution of fishing and appear to have contributed to an increase in the fishery's interaction with whales, particularly in 2012 (Groom and Coughran 2012 and Attachment 2).

For the 2009/10 season, a total allowable commercial catch (TACC) of 5,500 tonnes was set, which resulted in further effort reductions compared to 2008/09.¹⁴ For the 2010/11 season the first phase of a quota system was implemented, when individual catch limits were introduced alongside existing input controls and the TACC was set at 5,500 tonnes. For the 2011/13 season, a TACC of 6,938 tonnes was set for an extended licensing period of 14 months, to 14 January 2013. Commencing on 15 January 2013 the fishery will open each year on 15 January and remain open for 12 months. Several previous input controls have been removed and an Interactive Voice Response System for compliance and catch monitoring was introduced in 2011. The new management plan also provides for catch monitoring and other information to be provided electronically. Several other consequential amendments have also been made (refer to Attachment 1).

¹³ Graphs of puerulus settlement can be found at: <http://www.fish.wa.gov.au/Species/Rock-Lobster/Lobster-Management/Pages/Puerulus-Settlement-Index.aspx>

¹⁴ And even lower compared to 2007/08.

Consultation and workshop participants

A consultative and inclusive process was developed for the 2013 ERA, to ensure that all stakeholders were given early access to the Workshop Procedure (Stoklosa 2013) and the technical documents that were assembled to underpin the assessment of the hazards that were assessed (DoF 2013). Substantial effort was made to seek the participation of a cross-section of experts who could provide high quality analysis of technical documentation and perform a qualitative risk analysis.

A Stakeholder Working Group and a Technical Panel of subject matter experts were proposed for the ERA workshop. The Stakeholder Working Group comprised a wide range of stakeholders.

Persons having management roles and non-technical officers of organisations were recognised as non-participating observers within the Stakeholder Working Group. The rationale for making this distinction was to enable a free exchange of technical views in the workshop, without real or perceived pressures for subordinates of management officers to adopt a particular technical position.

The workshop organiser and facilitator was Richard Stoklosa of E-Systems, on behalf of the Department of Fisheries. Preparation and conduct of the workshop was strictly guided by the workshop procedure distributed to all stakeholders in January 2013 (Stoklosa 2013).

The composition and roles of the Stakeholder Working Group and the Technical Panel are elaborated below. Stakeholders were notified of the workshop date (20 February 2013) more than six weeks in advance.

Stakeholder Working Group

A Stakeholder Working Group was invited by DoF and WRLC to participate in the ERA workshop, including those involved in the previous 2007 ERA and others identified as having an interest in the proceedings. Stakeholders included individuals, organisations, companies, government agencies and research scientists having an interest and/or technical expertise. DoF identified a list of stakeholders who have expressed an interest in the MSC certification process for the WRL fishery, so that nominated participants could be informed of preparations for the workshop and be invited to attend.

The Stakeholder Working Group received summary information from the 2007 ERA as part of the Terms of Reference and Background Documents (DoF 2013) and the proposed workshop procedure (Stoklosa 2013), along with updated information on technical documents and management actions that were considered in the 2007 ERA to assess risk. There was an opportunity for any member of the Stakeholder Working Group to propose other published information to DoF for review by all participants prior to the workshop.

The number of 'observers' (non-participating management officers and non-technical officers) invited to the workshop was small, allowing for efficient consideration of technical issues by participants, whilst ensuring that all stakeholder views were appropriately represented. However, special efforts were made to invite non-participating observers from special interest groups and the MSC Certifying Body.

The Stakeholder Working Group was given the opportunity to review and discuss new technical information that had become available since the 2007 ERA.

Stakeholders represented the Department of Fisheries, Department of Environment and Conservation, Western Rock Lobster Council, Conservation Council of WA, World Wildlife Fund and fishermen.

Technical Panel

A Technical Panel was convened for the 2013 ERA with the support of a range of stakeholders, as a subset of the Stakeholder Working Group. The Technical Panel encompassed a range of scientific disciplines relevant to the fishery assessment.

Although there is no formula to obtain a ‘perfect’ mix of expert representation, the goal was to represent the range of stakeholder interests with persons who demonstrate recognised experience and qualifications in the subject matter, and have the capacity to provide high quality technical expertise for risk analysis.

The persons serving on the Technical Panel were:

Dr. Colin Buxton	Director, Tasmanian Aquaculture and Fisheries Institute University of Tasmania
Dr. Nick Caputi	Supervising Scientist, Invertebrates Western Australian Department of Fisheries
Dr John Keesing	Stream Leader, Sustainable Coasts and Industry CSIRO Marine and Atmospheric Research, Perth
Dr Alan Kendrick	Senior Research Scientist Department of Environment and Conservation, Western Australia
Dr. Neil Loneragan	Director, Centre for Fish and Fisheries Research Murdoch University, Perth

Mr. Douglas Coughran, Department of Environment and Conservation, Senior Wildlife Officer-Whales, was invited and intended to serve on the Technical Panel, but was unfortunately unable to attend. Mr Coughran provided a published summary of fishing interactions with whales to workshop participants (see Groom and Coughran 2012).

A Department of Fisheries report on whale entanglements is provided in Attachment 2.

Dr John Bannister, a whale expert, formerly with the Western Australian Museum and the International Whaling Commission, attended as a cetacean expert.

The Technical Panel’s role in the workshop was to participate in the discussion of the threats identified in the 2007 ERA, and to re-assess the risk level for these hazards under existing circumstances and fisheries management controls. Re-assessment was based on full consideration of published technical information and the management actions formally adopted by the WRL fishery or committed to by the DoF. New threats to ecological components were considered, including observations of whale entanglements in recent years and a recent change to a year-round fishing season and its possible ecological impacts, particularly at the Abrolhos Islands.

The Technical Panel also re-assessed the treated risk level for new or alternative management actions that were suggested by the Stakeholder Working Group. The re-assessment of treated risk was an important feature of the 2013 ERA—to identify potential risk management responses that might reduce risk to low levels, prior to embarking on more sophisticated risk analysis or scientific studies.

ERA workshop proceedings

A workshop agenda was distributed to all participants. All persons attending the workshop were invited to introduce themselves and area of expertise or interest. The agenda and workshop procedure (Stoklosa 2013) was adopted by all participants, noting that the agenda would be flexible to accommodate the time availability of participants with specific expertise. The workshop agenda and list of participants is presented in Attachment 3.

The starting point for the workshop was the information contained in the 2007 ERA and the substantial set of background documents that were provided to the Technical Panel and participants in the Terms of Reference and Background Documents (DoF 2013), presented in Attachment 4 for reference.

During the workshop, the recording of workshop proceedings in a structured risk assessment template was digitally projected, to enable all workshop participants to observe the information that was captured from the discussions. The template contained the information recorded from the 2007 ERA for discussion and review. All participants had the opportunity to clarify the technical record during the workshop to ensure accuracy and eliminate post-workshop word-smithing or revisions.

Clarification of risk analysis criteria

The consequence ratings are reproduced here in Tables 2 through 6, and the likelihood ratings are reproduced in Table 7.

Consequence and likelihood ratings

Workshop participants commented on the consequence and likelihood ratings adopted by DoF and published in the Workshop Procedure (Stoklosa 2013).

Participants would have liked to retain the consequence rating of ‘negligible’. In the case of TEP species (eg. sea lions), the words ‘in common’ in the consequence table were reported to present difficulty as they were interpreted to make consequence a function of likelihood. Consequence ratings (Tables 2 through 6) should be independent of likelihood (Table 7).

Table 2. Consequence ratings for target species.

Rating	Description of consequences
1	Measurable but minor levels of depletion to fish stocks.
2	Maximum acceptable level of depletion of stock.
3	Level of depletion unacceptable but still not affecting recruitment levels of stock.
4	Level of depletion of fish stocks are already (or will definitely) affect future recruitment potential/levels of stock.
5	Permanent or widespread and long term depletion of key fish stocks, close to extinction levels.

Table 3. Consequence ratings for non-target species (by-catch and by-product species).

Rating	Description of consequences
1	Measurable but minor levels of depletion to fish stocks.
2	Maximum acceptable level of depletion of stock.
3	Level of depletion unacceptable but still not affecting recruitment levels of stock.
4	Level of depletion of fish stocks are already (or will definitely) affect future recruitment potential/levels of stock.
5	Permanent or widespread and long term depletion of key fish stocks, close to extinction levels.

Table 4. Consequence ratings for TEP species.

Rating	Description of consequences
1	The level of capture is common but will not further impact on stock and well below that which will generate public concern.
2	Level of capture is the maximum that will not impact on recovery or cause unacceptable public concern.
3	Recovery may be being affected and/or some clear but short-term public concern will be generated.
4	Recovery times are clearly being impacted and/or public concern is widespread.
5	Further declines in threatened stocks are occurring or major public concern is ongoing.

Table 5. Consequence ratings for habitats.

Rating	Description of consequences
1	Measurable impacts to habitats but still not considered to impact on habitat dynamics or system.
2	Maximum acceptable level of impact to habitat with no long term impacts on region-wide habitat dynamics.
3	Above acceptable level of loss/impact with region-wide dynamics or related systems may begin to be impacted.
4	Level of habitat loss clearly generating region-wide effects on dynamics and related systems.
5	Total region-wide loss of habitat and associated systems.

Table 6. Consequence ratings for ecosystems.

Rating	Description of consequences
1	Measurable but minor change in the environment or ecosystem structure but no measurable change to function.
2	Maximum acceptable level of change in the environment/ecosystem structure with no material change in function.
3	Ecosystem function altered to an unacceptable level with some function or major components now missing and/or new species are prevalent.
4	Long-term, significant impact with an extreme change to both ecosystem structure and function. Different dynamics now occur with different species/groups now the major targets of capture or surveys.
5	Permanent or widespread, long-term damage to the environment. Total collapse or complete shift of ecosystem processes.

Table 7. Likelihood ratings for risk analysis.

Rating	Description of likelihood
1	Never heard of, but not impossible here (< 5% probability).
2	May occur here, but only in exceptional circumstances (5-30% probability).
3	Clear evidence to suggest this is possible in this situation (30-50% probability).
4	It is likely, but not certain, to occur here (50-90% probability).
5	It is almost certain to occur here (> 90% probability).

Risk ranking

Using the Technical Panel’s judgments of consequence and likelihood ratings, the risk is ranked as the product of the two ratings, as illustrated in the risk matrix in Figure 3. The risk matrix is used to rank risk in one of five levels, consistent with the adopted ESD Reporting Framework (Fletcher et al. 2002).

Although the risk matrix depicts a ‘risk score’ of 1 to 25, it is based on a strictly qualitative risk analysis. The risk scores are used as a convenient means of classifying risk in five levels (negligible to severe), but should not be interpreted in quantitative terms. An explanation of the required management response and reporting requirements for each risk level is summarized in Table 8.

		Consequence rating				
		1	2	3	4	5
Likelihood rating	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Figure 3. Risk ranking matrix.

Table 8. Risk rankings and expected action.

Risk ranking	Risk outcome	Likely reporting requirements	Likely management response
Negligible	Not an issue.	Minimal.	Nil.
Low	Acceptable; no specific control measures needed.	Justification required.	No specific response.
Medium	Acceptable; with current risk control measures in place (no new management required).	Full performance report.	Specific management and/or monitoring required.
High	Not desirable; continue strong management actions or new and/or further risk control measures to be introduced in near future.	Full performance report.	Increases to management activities needed.
Severe	Unacceptable; major changes required to management in immediate future.	Full performance report.	Increases to management activity needed urgently.

The Technical Panel commented on the risk ranking adopted by DoF (reproduced in Figure 3), when combining the consequence and likelihood ratings. The Technical Panel noted that a likelihood table rating of 3 suggests that an event is plausible (around 50% likelihood of the consequences occurring). When this likelihood rating of 3 is combined with a consequence that is considered unacceptable (rating of 3), the result ends up with a ‘medium’ risk ranking (Figure 3) which was contrary to the Technical Panel’s expectations. The Technical Panel suggested such a situation should represent a ‘high’ risk.

Advice was given to suggest that Table 8 may be the mechanism for changing the wording for the ‘risk outcome’ to remedy this observation, particularly for the likelihood rating of 3 and consequence rating of 3. As it eventuated in the workshop, analysis of all of the threats resulted in scores that were below the likelihood rating of 3 combined with the consequence rating of 3 (refer to the sub-heading ‘Risk analysis’ in this report, below). Therefore the observation by the Technical Panel is presented as advice to DoF for general consideration, without having a potential effect on the risk ranking outcomes of the subject Western Rock Lobster assessment.

Threat identification

The workshop presented an opportunity to re-assess each of the threats previously identified in the 2007 ERA through review and discussion of relevant technical documents and information. After risk assessments of the WRL fishery in 2002, 2005 and 2007, it was expected that a comprehensive identification of threats had been completed. However, DoF nominated two threats to the agenda for specific consideration:

- Re-assessment of the entanglement of whales (formerly assessed as ERA Reference No. 10 in the workshop record); and
- Assessment of the change to year-round fishing activity in the Abrolhos Islands (added as a new threat for assessment as ERA Reference No. 37 in the workshop record).

Workshop participants were also given an opportunity to nominate any new threats not previously identified. A total of 16 threats were considered in the 2013 ERA—noting the ERA reference numbers in the first column of the workshop record in Attachment 5.

A member of the Stakeholder Working Group or Technical Panel was invited to introduce each threat to the group, to enable all participants to discuss the circumstances and applicable management regime. The person nominated to introduce each threat was noted on the workshop agenda (Attachment 3).

Risk assessment

Following the introduction of each threat and clarification of the causes and effects of the interaction, an ‘interaction scenario’ was discussed by workshop participants and recorded in the risk assessment record. Existing risk management controls were identified for each threat to assist with the risk analysis part of the assessment. The completed risk assessment record for all threats considered in the ERA is presented in Attachment 5. Only the Technical Panel contributed to the judgments made in the risk analysis, with input from the Stakeholder Working Group.

Some of the threats were assessed at more than one level, to distinguish between shallow and deep interactions (Hazard No. 23: Kalbarri–Big Bank community), or different TEP species

(Hazard No. 10: Southern Right Whale, Humpback Whale). In the case of benthic biota (Hazard No. 25), eight different interaction scenarios were identified, based on the type of sea floor habitat and water depth (shallow, deep). These distinctions were made to ensure that the risk analysis focused on very specific interactions rather than attempting to make judgments about broad scenario descriptions that could be interpreted in different ways.

Risk analysis

The risk analysis undertaken for each hazard scenario utilised the consequence categories defined in Table 2 through Table 6 and the likelihood categories defined in Table 7. It relied on expert judgment, in this case the Technical Panel, to make qualitative estimates of the consequences of a hazard for the ecological component identified in the interaction scenario, and the likelihood of those consequences eventuating. Judgments were based on expert knowledge, technical documentation and data.

The Technical Panel was instructed by the facilitator to seek consensus in their judgments of consequences and likelihood whenever possible, without losing any individual differences of opinion. It was made clear that the range of judgments of Technical Panellists would be recorded in the event that consensus could not be achieved. In the case of this 2013 ERA, consensus was achieved in the risk analysis of all threats.

Four elements of the pre workshop planning and workshop structure were important in helping achieve consensus:

1. The organisation and early distribution of technical documents;
2. The rigorous and structured risk assessment procedure that was developed in consultation with DoF and widely distributed to workshop participants well in advance;
3. The development of very specific interaction scenarios to distinguish different circumstances that could occur for certain threats; and
4. The substantial workshop time dedicated to informed debate and technical understanding.

Of the 16 threats/hazards assessed in detail, which consisted of 33 interactions, 19 interactions were ranked as 'low' risk and 14 were ranked as 'negligible' risk by the Technical Panel under existing management controls. This represents a reduction in the overall rankings of risk in the 2007 ERA, where four 'moderate' risks were identified. Changes in these moderate risk rankings in the 2007 ERA to low or negligible risk rankings in the 2013 ERA are attributed to:

- Establishment of a quota system to manage catch and hence provide greater control on efficiency changes (ERA Ref. No. 3);
- Longer time series of deep water research data which gives more confidence that community-level impacts are unlikely to be occurring (eight year FRDC project) (ERA Ref. Nos. 22 and 23);
- Significant management changes to reduce capture/exploitation, particularly in breeding stock areas (eg. closure of the deep water Big Bank area since 2009) (ERA Ref. No. 23); and

- Banning of bait bands on all fishing vessels to virtually eliminate the threat of entanglement with TEP species (eg Dusky Whaler) (ERA Ref. No. 32).

The record of the risk analysis, detailing the existing risk management responses for each hazard, the consequence and likelihood ratings, and the risk ranking for existing management controls is presented in Attachment 5.

Risk treatment

Risk treatment is not strictly required for low and negligible risk (refer to Table 8). However, participants were encouraged to suggest sensible and cost-effective risk treatment measures which might further reduce the consequences and/or likelihood rating. These are recorded in Attachment 5 for the threats where risk treatment was suggested.

Suggested risk treatment measures (beyond those already planned) are recorded as important advice to DoF for consideration, but may not be adopted by the fishing industry or government to manage risk in the WRL fishery. The risk analysis was repeated in cases where additional risk treatment measures were suggested, to show the 'treated risk'. The treated risk is a reflection of the residual level of risk if the risk treatment measures were adopted.

The assessment of the change to year-round fishing activity, particularly at the Abrolhos Islands (added as a new threat for assessment as ERA Ref. No. 37 in the workshop record) was ranked a low risk under existing management controls. This ranking was noted to carry uncertainty due to the lack of data because the 7.5 month fishing season was only recently extended (see Attachment 1 for details). However, adoption of easily-implemented remedial measures could result in a ranking of negligible risk (refer to Attachment 5).

Risk management

Risk management of the WRL fishery involves standardised fishing practices and fishing gear, industry standards and codes of practice, legislation, and research and monitoring of management effectiveness. The MSC Principles and Criteria for Sustainable Fishing set out the standards for the certification program.

MSC Principle 2 for sustainable fishing states:

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

There are three assessment criteria that have been addressed by this ERA for managing risk (numbered as per the assessment criteria established for the WRL fishery):

- 2.1.4.1 *The impacts of the fishery on ecosystem structure, function, biological diversity, productivity, and habitat structure are within acceptable levels of impact and there has been an assessment of risks.*
- 2.1.4.2 *Management objectives and fishing practices are set in terms of impact identification and avoidance/reduction.*

2.2.1.4 *The impacts of the fishery on protected, endangered, threatened, or icon species do not exceed acceptable levels.*

The first two assessment criteria (2.1.4.1 and 2.1.4.2) have been addressed through the process of conducting the subject ERA and the results of the assessment, as documented in this report. The ERA procedure was subject to consultation with DoF, incorporating helpful suggestions, and provided to stakeholders well in advance of the workshop. The workshop facilitator consulted with stakeholders prior to the workshop, to review the workshop procedure and discuss questions posed by stakeholders.

The third assessment criteria (2.2.1.4) has been addressed by the analysis contained in the ERA, where threats to TEP species were specifically assessed. In particular, recent data on whale entanglements (Groom and Coughran 2012 and Attachment 2) were considered. The implementation of sea lion exclusion devices in the Abrolhos Islands and the prohibition of bait bands on fishing vessels to avoid entanglement with TEP species have been considered as long term management commitments when undertaking the ERA. These commitments and the assessment of risk also address assessment criteria 2.2.2.1, regarding the fishery's management practices to avoid impacts to TEP species.

Conclusion

The ERA undertaken on 20 February 2013 resulted in the outcomes documented in the risk assessment workshop record presented as Attachment 5. All of the threats on the agenda were assessed using a consultative and structured workshop procedure, addressing the requirements of the certifying body for MSC re-certification of the fishery. Consensus was reached on the expert judgements of the Technical Panel in this qualitative ERA.

All of the threats were ranked low or negligible risk under present circumstances. As such, no specific management response is required to reduce the risk ranking of these threats. However, some sensible and cost-effective risk treatment measures have been suggested to further reduce risk, for consideration by the DoF and the WRL fishing industry.

Ongoing performance monitoring of the fishery should confirm that these risks remain negligible to low. In the event that circumstances of the fishery change or performance monitoring detects an unexpected change, the relevant threats should be re-assessed.

References

DoF 2007. Proceedings of the Western Rock Lobster Ecological Effects of Fishing Workshop. 8-10 August 2007, November 2008. Fisheries Occasional Publication No. 53.

DoF 2013. Terms of Reference and Background Documents for the 20 February 2013 Environmental Risk Assessment. See Attachment 4 for a full list of references and website links.

Fletcher, W.J., J. Chesson, M Fisher, K.J. Sainsbury, T. Hundloe, A. Smith and B. Whitworth (2002). *National ESD reporting framework for Australian fisheries: The 'how to' guide for wild capture fisheries*. FRDC Project 2000/145, Canberra.

Groom, C.J and D.J Coughran (2012). *Entanglements of baleen whales off the coast of Western Australia between 1982 and 2010: Patterns of occurrence, outcomes and management responses*. Pacific Conservation Biology Vol. 18: 203-214. Surrey Beatty and Sons, Sydney.

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Attachment 1

Changes to Fishery Management Controls 2008/2009 through 2013

Summary of legislated changes in the West Coast Rock Lobster Fishery from 2008/09 season to 2013.

2008/09	<p>15 November – Effort reduction: unit values (number of pots per unit) of</p> <p style="padding-left: 40px;">Zone A – 0.66</p> <p style="padding-left: 40px;">Zone B – 0.66</p> <p style="padding-left: 40px;">Zone C – 0.74</p> <p style="padding-left: 40px;">Sunday closure for all zones and all season with the exception of the first two weeks in Zone A</p> <p>30 November – Effort reduction: unit values (number of pots per unit) of</p> <p style="padding-left: 40px;">Zone A – 0.54</p> <p style="padding-left: 40px;">Zone B – 0.54</p> <p style="padding-left: 40px;">Zone C – 0.62</p> <p>24 February – Closure of Big Bank for the remainder of the season</p> <p>1 March – Effort reduction: unit values (number of pots per unit) of</p> <p style="padding-left: 40px;">Zone A – 0.42</p> <p style="padding-left: 40px;">Zone B – 0.42</p> <p style="padding-left: 40px;">Zone C – 0.50</p> <p>6 March – Saturday and Monday closures for all zones and all season</p> <p style="padding-left: 40px;">Sunday closure for the first two weeks of Zone A continuing all season</p> <p style="padding-left: 40px;">Removal of Zone C moon closures</p> <p>15 March – Maximum size of female lobsters in Zone A and B reduced to 95mm</p> <p style="padding-left: 40px;">Minimum size in Zone C increased to 77mm</p> <p>1 May – back to 5 fishing days per week (Saturday and Sunday closures)</p>
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2009/10

- Effort reduction: unit values (number of pots per unit) of:
Zone A - 0.36
Zone B - 0.40
Zone C - 0.44
- Temporal closures:
Zone A - 4 days a week all season
Zone B & C - 4 days a week during “whites” and “reds” peaks
(December 1 to December 31 and March 15 to April 14)
Zone B & C - 5 days a week for rest of the season
- Changes in maximum female size:
Zone A & B - 105mm to 95mm
Zone C - 115 mm to 105 mm
Minimum size of 77mm all season
- All pots must have at least three escape gaps 55 mm high and 305 mm wide
- Total Allowable Commercial Catch (TACC) of 5,500 tonnes set for the 2009/10 season.
- removal of soaking periods prior to the start of the season (provision made to load and bait pots and move in the Fishery 7 days before the start of the season)
- Big Bank to remain closed
- Rock Lobster processors to submit weekly catch (only) returns, to be received by the Department no later than COB Tuesday, each week of the season (in addition to monthly reporting requirements)
- Carrier boats permitted to carry more than 4 rock lobster pots.

December 2009

- prohibit fishing in Zone B between 25 December 2009 and 10 January 2010 inclusive;
- continue the prohibition on fishing on Friday, Saturday and Sunday each week throughout the remainder of the first half of the season catch target period in Zone B;
- prohibit fishing in Zone C between 25 December 2009 and 3 January 2010 inclusive; and
- B Zone summer closures removed.

January 2010

- Closure in Zone B extended to 25 January; and
- Prohibit fishing in Zone C between 16 January and 17 February 2010
- Prohibit fishing on Fridays in Zone C from 1 Feb to end of season.

	<p>February 2010</p> <ul style="list-style-type: none"> • Prohibit fishing in Zone C between 12 March and 21 March • Change unit value to 0.30 for Zone C effective 21 March; • Zone A prohibited from fishing in Zone B for the remainder of the season as of 15 February 2010; and • Prohibit fishing in Zone B between 12 March and 11 April. <p>• Zone B permitted to fish Friday's for the remainder of the season.</p> <p>May 2010</p> <ul style="list-style-type: none"> • Zone C closed for the remainder of the season – effective 10 May; and • Zone A closed for the remainder of the season – effective 17 May. <p>June 2010</p> <ul style="list-style-type: none"> • Zone B closed for the remainder of the season – effective 15 June
2010/11	<ul style="list-style-type: none"> • Total Allowable Commercial Catch (TACC) of 5,500 tonnes set for the 2010/11 season. • Individual catch limits introduced with the following number of kilograms per unit: <ul style="list-style-type: none"> Zone A – 36kg from 15 November to 14 March Zone A – 51kg from 15 March to end of season Zone B – 81kg for entire season Zone C – 75kg for entire season • Fishing prohibited on weekends until late June 2011 • Big Bank to remain closed • Introduction of a 14 nm² closed area in deep water for research purposes • Season extended to 31 August • Zone C start date moved from 25 November to 15 November • 20 fathom rule removed • Introduction of crate tags, catch and disposal records, registered receivers, approved landing areas, holding over book and catch weighing procedures to monitor fishers' catch • Limited “within-season” transferability of licences and entitlement. • Implementation of two new additional sea lion exclusion devices (SLED) zones within the Abrolhos Island area (Pelsaert and Easter Group Islands)

2011/13	<ul style="list-style-type: none"> • TACC of 6,938 tonnes set for extended licensing period 1 October 2011 to 14 January 2013 • This equates to the following catch limits per unit: <ul style="list-style-type: none"> Zone A (in Zone B) - 52kg from 15 November to 14 March and 1 July to 30 September Zone A - 48kg from 15 March to 30 September Zone B - 96kg for entire season Zone C - 102kg for entire season • Zone A fishers permitted to return to Zone B after 30 June following nomination • Weekend, Xmas and New Year closures removed • Season extended to 30 September (season closed 1 October 2012 to 14 November 2012) • Full transferability of licences and entitlement • Interactive Voice Recording System for compliance and catch monitoring introduced • Reduction in minimum unit holding from 63 to 60 units of entitlement
15 January 2013 onward	<ul style="list-style-type: none"> • A new management plan has moved the Fishery to quota management was published in the Government Gazette on 17 October 2012¹⁵. The new plan came into effect on 15 January 2013. • Season open twelve months of the year as of 15 January 2013.

¹⁵ A copy of the new West Coast Rock Lobster Managed Fishery Management Plan can be found at:
[http://www.slp.wa.gov.au/gazette/gazette.nsf/gazlist/798980909FF0A04648257A990042B081/\\$file/gg187.pdf](http://www.slp.wa.gov.au/gazette/gazette.nsf/gazlist/798980909FF0A04648257A990042B081/$file/gg187.pdf)

Attachment 2

Whale Entanglements in the Western Rock Lobster Fishery and Other Western Australian Fisheries

Department of Fisheries Western Australia Report

Whale Entanglements in the Western Rock Lobster Fishery and Other Western Australian Fisheries

Background

Each year the western rock lobster fishery (WRLF) interacts with migrating humpback whales (*Megaptera novaeangliae*) and southern right whales (*Eubalaena australis*). The interactions consist of entanglements with pot ropes and boat strike. Historically, direct interactions have ranged from between none and four each season with this range having become a key performance indicator (KPI) for the fishery being one of the criteria used to determine the approval of the fisheries export license from the Commonwealth Government (SEWPaC). Specifically this KPI is described as “... *that there is no increase in the rate of interactions with whales and dolphins (entanglements).*”

It was recognised at the time the acceptable range was developed that the rate of whale interactions was likely to increase through time given the increasing numbers of whales migrating along the west coast. The recent level of interactions has however increased well above the KPI level with reports for the current year (to September 2012) being the greatest number in the time-series which began in 1990. Although not presented separately by fishery, Figure 1 provides an illustration of this recent increase.

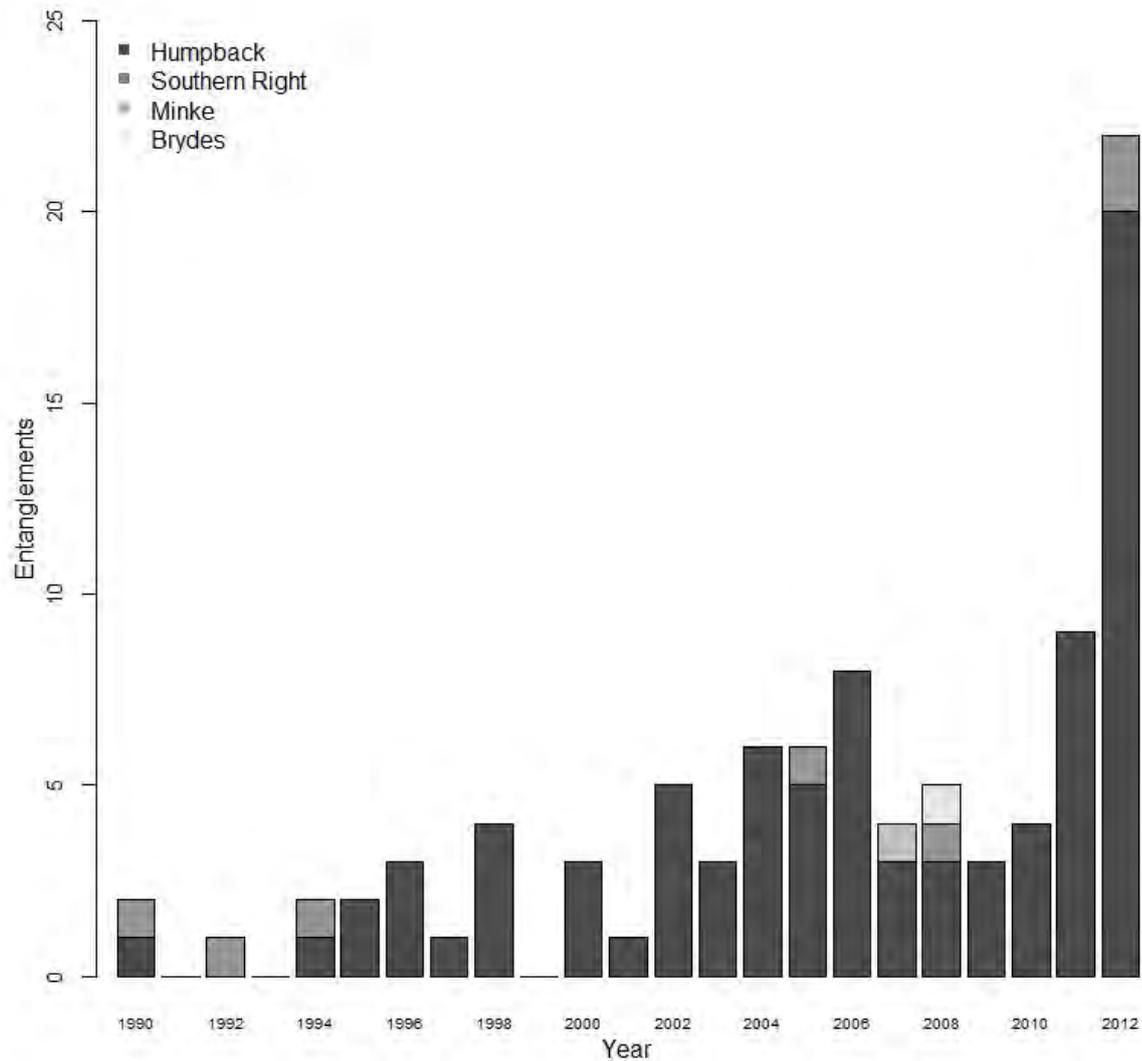


Figure 1. Entanglements of whales in fishing gear off Western Australia (updated from Groom and Coughran *in press*). 2012 data up to September.

The majority of fishing gear interactions are with WRLF gear, and hence, entanglements are likely to remain high under the current fishing patterns (winter fishing) of the WRLF and population growth of W.A. Humpback whales (see below). A code of practice for the WRLF to reduce whale entanglements was introduced in 2007 highlighting the need for fishers to reduce slack rope of the surface, not set pots in clusters and to regularly check pots among other initiatives. This, along with the reductions in fishing effort that occurred during 2007 – 2010 probably resulted in the observed reductions in entanglements across this period (Figure 2). However, with the recent change in fishing patterns and concomitant increase in entanglements additional mitigation measures are likely to be needed to reduce entanglement rates.

Western Australia Humpback Population

Humpback whales are involved with the majority (~90%) of entanglements in Western Australia (Figure 1), due their more coastal migration pattern and their overall morphology (Groom and Coughran *in press*). Humpbacks have long pectoral fins which are “knobbly” (Clapham and Mead 1999), which increase their likelihood of entanglement. The population of humpback whales (Breeding Stock ‘D’) that migrates along the west coast of Australia is the largest population of humpbacks whales in the southern hemisphere (Leaper et al. 2008). The population size is estimated to continue to grow until 2020 where it is predicted to return to pre-whaling levels (Johnston and Butterworth 2009).

The temporal and spatial knowledge of this migration comes from whaling data, photographic data and both aerial and boat surveys. These data have been summarised by Jenner et al. (2001), which revealed a northern migration along the coast starting around the “Capes” in June, continuing north through until August. By the end of August, the majority of whales surveyed off Point Cloates (Ningaloo) were undertaking their southern migration (Chittleborough 1953), which extends through to November. There appears to also be a sexual segregation in the timing of both the northern and southern migrations, especially for those females that are pregnant or with calf: The latter group tend to migrate after the males in both the northern and southern migrations (Chittleborough 1965). Spatially, there appears to be a difference between the northern and southern migrations with the northern migration tending to be further offshore, while the southern migration is more coastal (see Jenner et al. 2001)

Entanglements of whales with western rock lobster fishery

The northern migration of humpback whales along the WA coast coincides with the 'traditional' end of the western rock lobster fishery (June 30). Just over half of all reported whale entanglements are associated with rock lobster pots, however there are also entanglements associated with aquaculture and other pot based fisheries (crab and octopus) (Groom and Coughran *in press*). Analysis of entanglement rates with WRLF gear has shown an increase since recording began back in the early 1990's (Groom and Coughran *in press*). Entanglements rates did drop between 2006 and 2010 (Figure 2), which, as outlined above, was probably the result of the introduction of industry codes of conduct for a range of fisheries to reduce the likelihood of interactions (Groom and Coughran *in press*), as well as significant reductions in pot lifts within the WRLF during this time (de Lestang et al. 2011) (Figure 2).

However, over the last few seasons (2010/11 and 2011/13) there have been significant changes to the management arrangements for the western rock lobster fishery. The move to quota-based management has included a change to season length with the season extending until the end of August in 2011 and September in 2012. The 2013/14 season is due to be the first season with no temporal closure, allowing fishing to occur year round.

The extension of the season has led to a movement of fishing effort more into months when the humpback migration occurs, resulting in a significant increase in the number of whale entanglements in fishing gear, and predominantly lobster fishing gear (Figure 1). While there are more pots being fished in the winter months, the number of days that the pots remain in the water is also important (Figure 2).

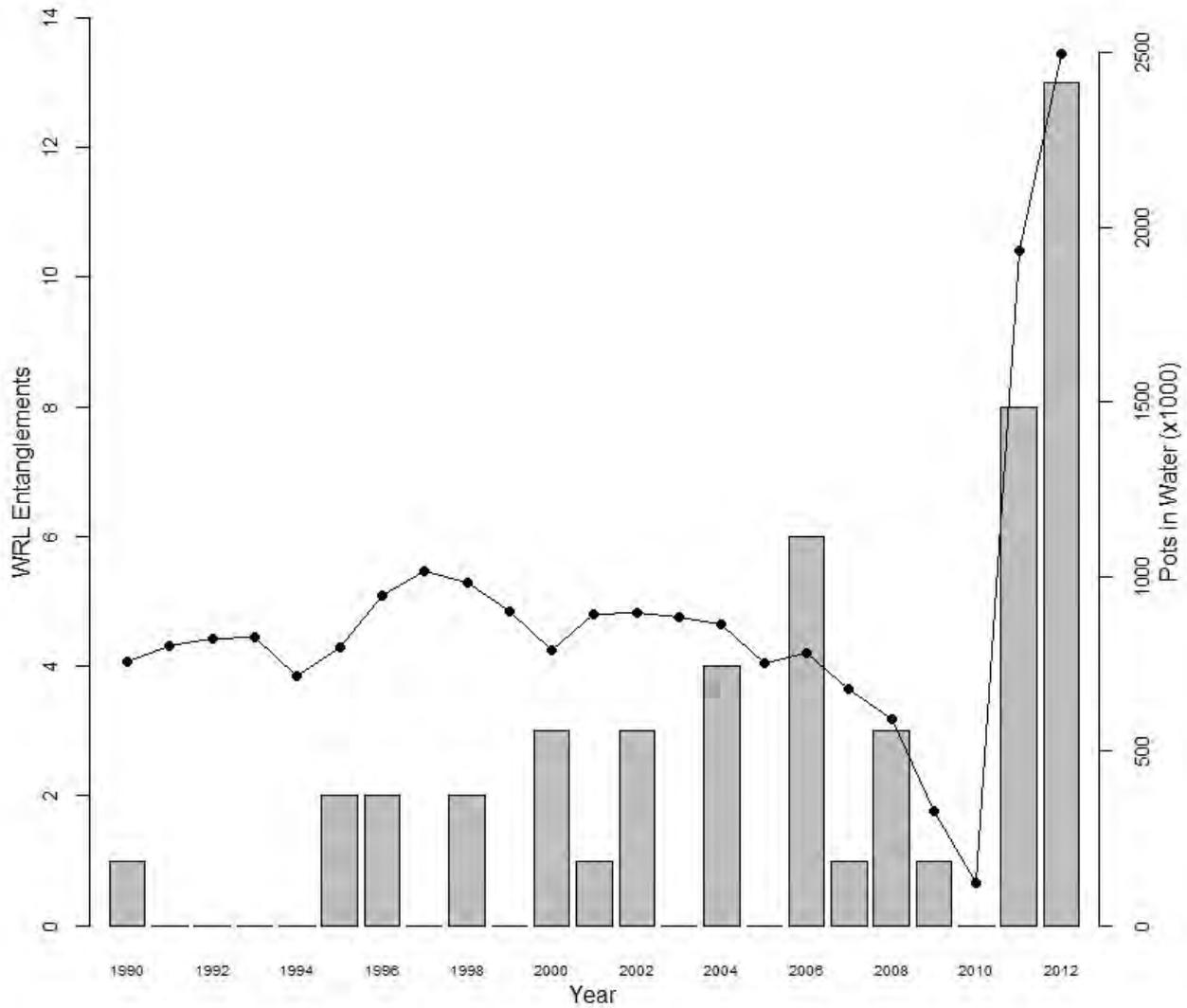


Figure 2. Entanglements in confirmed WRL gear (bars) and the number of pots being fished multiplied by no. of days in the water (points and line) during the winter months (May-Oct inclusive).

In 2012 there have been 22 entanglements of humpbacks in fishing gear to September (Figure 1), with 13 of these being confirmed as WRLF gear (Figure 2). Previously entanglements have occurred predominantly in June (Figure 3) as the season finished on 30 June until 2010. It should be noted that these are the dates at which the entangled whale was spotted, and may represent some period of time after the entanglement actually occurred. In the last two years, with the increase of pots in the water in later months (Figure 2), the number of recorded entanglements has moved to more entanglements in these later months (Figure 3).

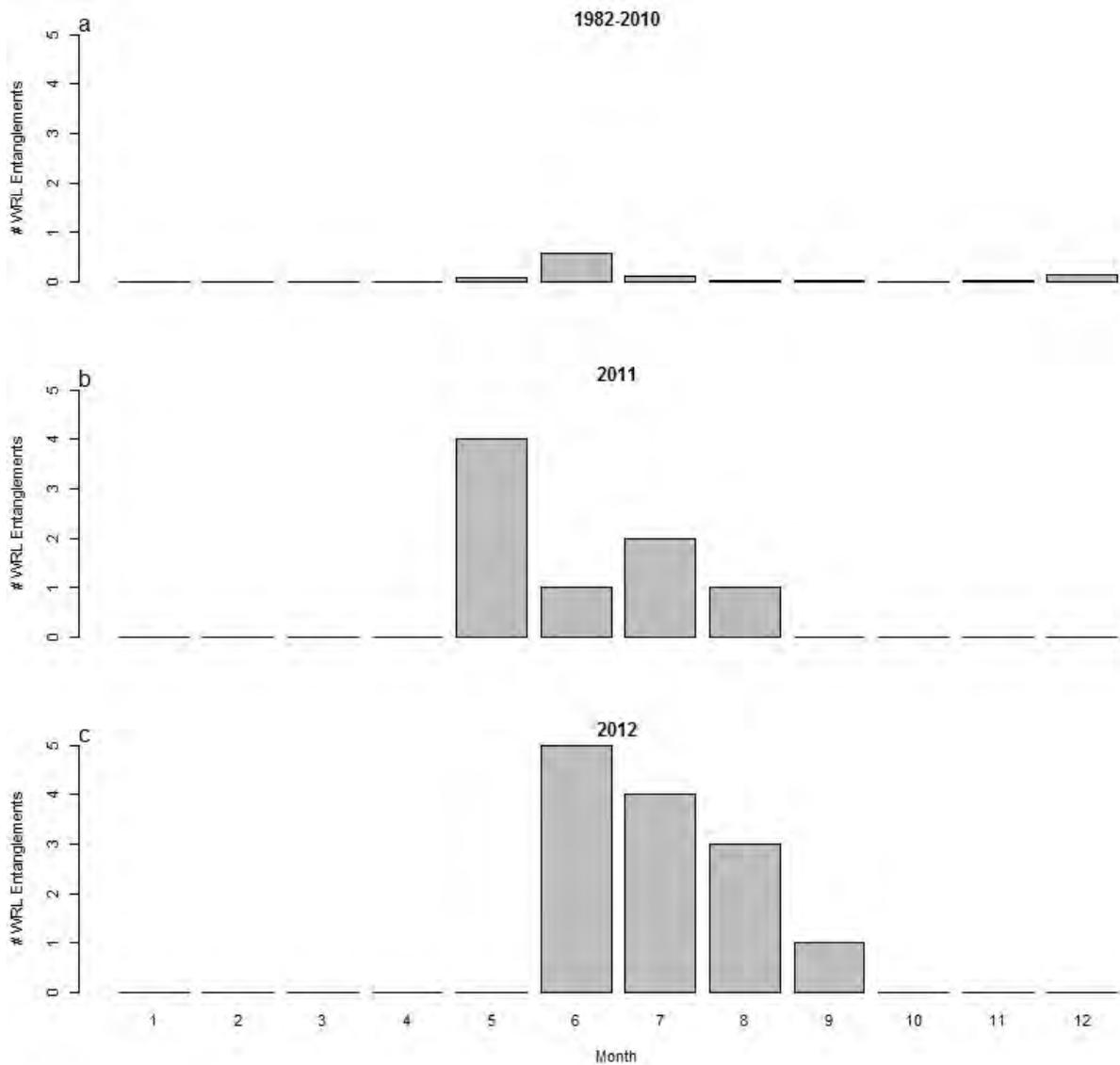


Figure 3. Number of WRL entanglements per year by month for the periods a) 1982-2010; b) 2011 and c) 2012.

There were 16 entanglements in the last 2 years where the identification no. of the fishing gear could be determined. 13 of these were lobster gear, with 3 entanglements from octopus fishing. For the octopus entanglements, the fisher's area of operations was determined from logbook returns. For the lobster gear, catch disposal records were assessed for 30 days prior to the entanglement. In most cases, only one block was fished. Where more than one block was taken, a weighted mean position was established using the number of pots in the water at the block locations.

These locations of where pots were fished that resulted in entanglements spanned from just south of Fremantle to the Abrolhos Islands (Figure 4a). They however do not appear to be related to areas of high winter fishing ‘effort’, as expressed as pots in the water (Figure 4b).

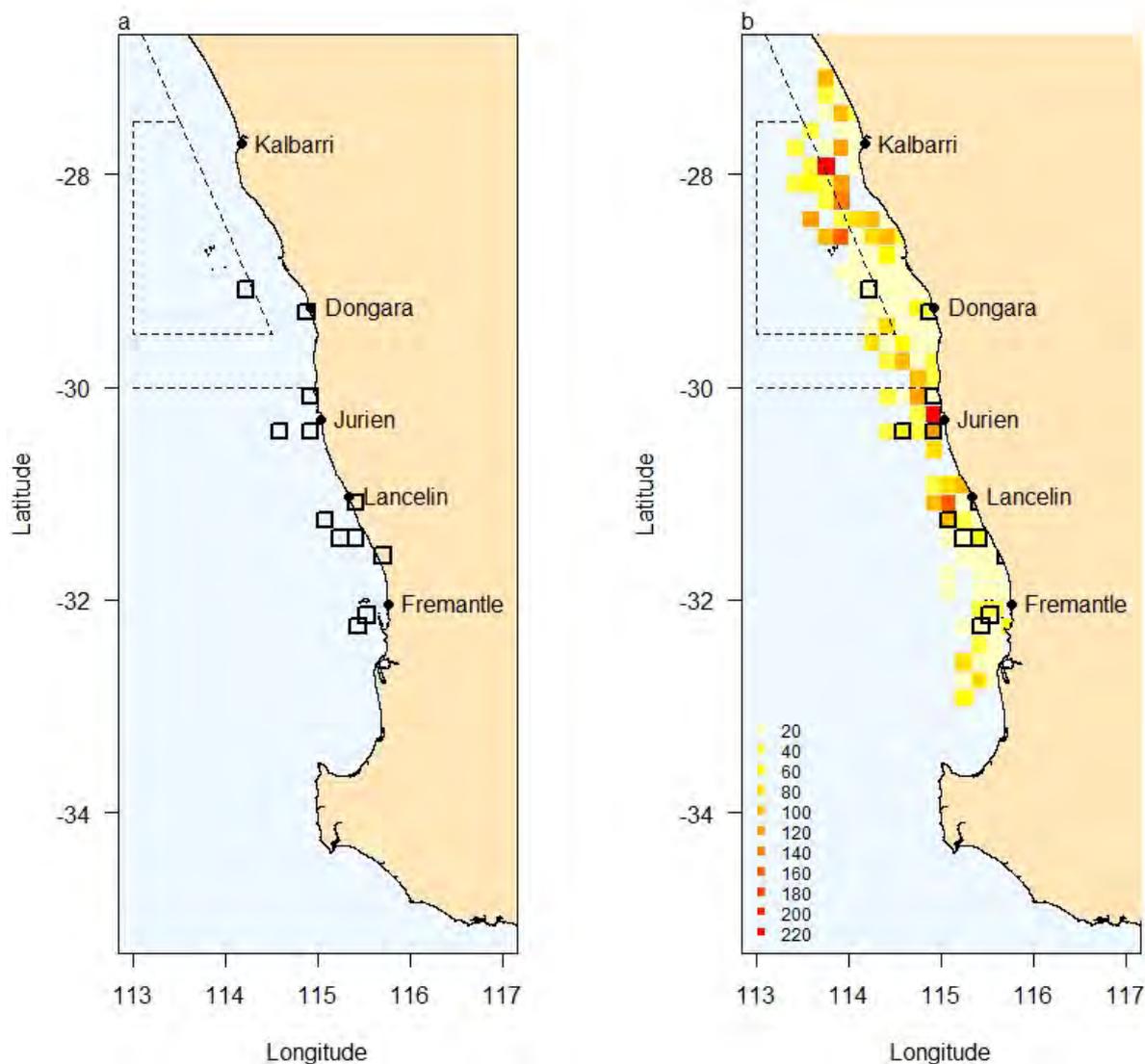


Figure 4. a) “Location” of whale entanglements where fisher identity could established; b) “Location” of whale entanglements (as per part a) with number of winter pots in the water (pots x days in water during May-Oct) (x1000)

Entanglements with WRL gear occurred in all depths, though the majority (77%) were in 20 to 40 fathoms (Figure 5a). This is not reflective of the ‘effort’ that was fished in these depths over the last two winters, which shows most of the pots in the water were in the 10 to 30 fathoms, with little potting effort in the shallows (0-9 fathoms) or in the deep (30-39 fathoms). When

entanglements in WRL gear are standardised for effort (pots in the water), there were clearly more entanglements in WRL gear set in water of 30 + fathoms (Figure 5b). This fits with the migration patterns of humpbacks along the west coast which appear to be further offshore on their northern migration. It may also reflect the nature of fishing in deeper water. Deeper set pots tend to have greater surface line and more floats to compensate for the greater drag on the gear from strong offshore currents.

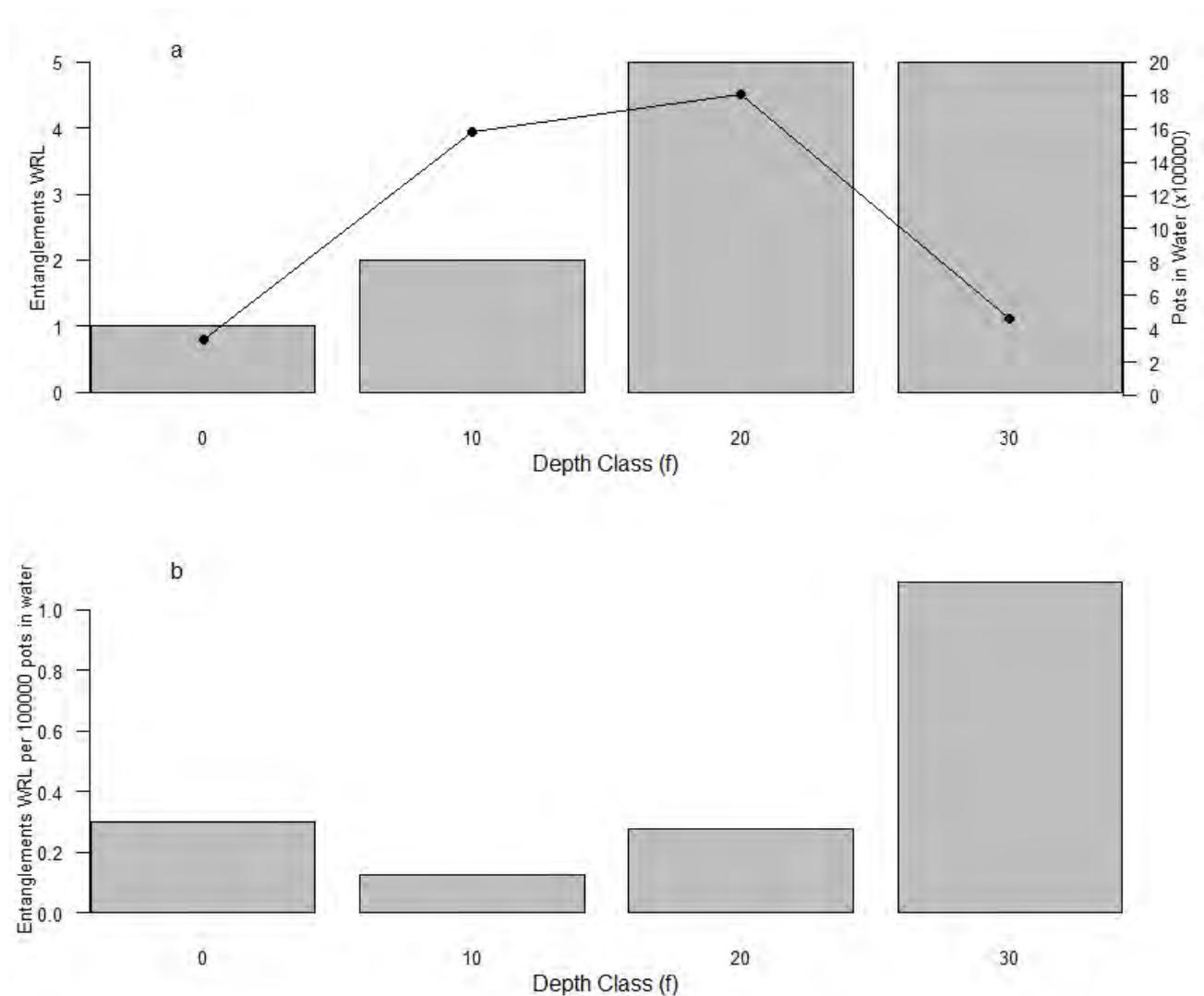


Figure 5. a) Number of whale entanglements in WRL gear for each of 10 fathom depth classes (grey bars) and the number of pots in the water during the 2011 and 2012 winter (May-Oct) (black dots and line) for the respective depth classes; b) Number of entanglements standardised per 100,000 WRL pots in the water in winter (as above).

Key Points

- There has been a dramatic increase in the number of whale entanglements associated with the northern migration of humpback whales in the last two years.
- This level of interaction is not meeting our KPI for whale entanglements.
- With the southern migration having now begun (the northern turn-around begins late August), further interactions may still occur this season.
- Without changes to fishing behaviour or gear, the numbers of interactions is likely to increase in following seasons due to both further whale population increases and season expansion.
- Most interactions occur with the float gear and ropes of the set pots.
- Interactions appear to occur at locations throughout the fishery.
- While interactions can occur in all depths, there are significantly more entanglements in deeper water (30+ fathoms) on per pots in the water basis
- Interactions with WRL gear begin mainly in June and extend for the remainder of the year when fishing occurs. There is an increased duration of interactions with increasing season length.
- The southern migration, which includes mothers with new born calves, tends to be closer to the coast and occurs later in the year (Oct-Nov). Fishing hasn't occurred in these months previously (1 Oct - 14 Nov). With this migration being more inshore, there is the potential for an increase in entanglements is enhanced if fishing continues during this time period.

References

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- Chittleborough RG (1965) Dynamics of two populations of humpback whale, *Megaptera novaeangliae* (Borowski) *Australian Journals of Marine and Freshwater Research* 16: 33-128
- Clapham PJ and Mead JG (1999) *Megaptera novaeangliae*. *Mammalian Species* 604: 1-9
- de Lestang S, Caputi N, How J, Melville-Smith R, Thomson A and Stephenson P (2011) Draft Stock Assessment for the West Coast Rock Lobster Fishery. Fisheries Research Report No. 217. Department of Fisheries, Western Australia. 226pp.
- Groom CJ and Coughran DK *in press* Entanglements of baleen whales off the coast of Western Australia between 1982 and 2010: patterns of occurrence, outcomes and management responses
- Johnston SJ and Butterworth DS (2009) Updated assessments of southern hemisphere humpback whales from breeding stocks D and G. Paper SC/58/SH3 presented at the Southern Hemisphere Humpback Whale Workshop. 3-6 February 2009, Seattle. Available from <http://iwcoffice> (search for SC/58/SH23). Accessed 8 February 2012
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Attachment 3

Workshop Agenda and Participants

Agenda

Date	20 February 2013	
Location	Western Australian Fisheries and Marine Research Laboratories Conference Rooms 1-2, 1 st Floor 39 Northside Drive Hillarys, Western Australia (08) 9203-0111	
Facilitator	Richard Stoklosa, E-Systems	
Purpose	Ecological Risk Assessment of the Western Rock Lobster Fishery, Re-assessment of 2007 ERA and consideration of new interactions and threats	
08:30	Welcome and introductions	Jo Kennedy / Richard Stoklosa
08:45	Adoption of workshop agenda and procedure	Richard Stoklosa
09:00	Report on low puerulus settlement research	Nick Caputi
09:20	Report on current stock assessment and harvest strategy	Simon de Lestang
09:40	Report on implementation of the harvest strategy and decision rules management policy	Graeme Baudains and Jo Kennedy
10:00	Review and update 2007 ERA risk estimates <ul style="list-style-type: none">▪ Implementation of SLEDs in the Abrolhos Islands (Ref No. 12)▪ Elimination of bait bands (Ref No. 32)▪ Community-level threats from stock removal (Ref Nos. 19-23)▪ Implications of a full individual transferrable quota system<ul style="list-style-type: none">- 12-month fishing season- High-grading of catch- Handling of breeding stock (berried females)- Other implications▪ Other changes in management of risks?	Group discussion Intro by Graeme Baudains Intro by Graeme Baudains Intro by Lynda Bellchambers Intro by Jo Kennedy / Jason How / Simon de Lestang
10:30	Morning tea	
10:50	Continue review and update of 2007 ERA risk estimates	Group discussion
12:00	Assess interaction with whales and threat of entanglement (Ref No. 10)	Intro by Jason How / Group discussion
13:00	Lunch break	
13:45	Continue assessment of interactions with whales (Ref No. 10)	Group discussion
15:00	Assess interactions with Abrolhos Islands ecology due to extended fishing season	Intro by Laurie Caporn
15:15	Review of Abrolhos waste management	Intro by Laurie Caporn
15:30	Review progress and next steps	Richard Stoklosa / Jo Kennedy
16:00	Adjourn	

Western Rock Lobster Ecological Risk Assessment Workshop Participants, 20 February 2013

Name	Organisation / company affiliation	Title / position / area of expertise
Technical Panel		
Colin Buxton	Institute of Marine and Antarctic Science	Professor University of Tasmania— Fisheries, MPAs
Nick Caputi	WA Department of Fisheries	Supervising Scientist, Rock Lobster Stock Assessment
John Keesing	CSIRO Marine and Atmospheric Research	Stream Leader, Marine Science Program
Alan Kendrick	WA Dept of Environment and Conservation	Conservation Research / Management
Neil Loneragan	Murdoch University	Director, Centre for Fish and Fisheries Research
Stakeholders		
John Bannister	Western Australian Museum	Whales
Lynnath Beckley	Murdoch University	Fisheries / Marine Science
Lynda Bellchambers	WA Dept of Fisheries	Scientist, Marine Biodiversity
Graeme Boudains	WA Dept of Fisheries	Principal Management Officer, Rock Lobster
Laurie Caporn	WA Dept of Fisheries	Principal Management Officer, Abrolhos Islands
Simon De Lestang	WA Dept of Fisheries	Research Scientist, Rock Lobster Stock Assessment
Nic Dunlop	Conservation Council of Western Australia	Environmental Science and Policy Coordinator
Jason How	WA Dept of Fisheries	Scientist, Rock Lobster
Sam Koncurat	Western Rock Lobster Council / Rock Lobster Fisherman	Director
Matt Pember	WA Dept of Fisheries	Scientist, Rock Lobster Ecology
Ron Shepherd	WA Dept of Fisheries	Regional Manager, Midwest
Peter Trott	World Wildlife Fund	Policy Manager—Fisheries Markets
Ray Yukich	Rock Lobster Fisherman	

Observers		
John Cole	Western Rock Lobster Council	Director
John Harrison	Western Rock Lobster Council	Chief Executive Officer
Jo Kennedy	WA Dept of Fisheries	Manager, Rock Lobster
John Ritchie	Geraldton Fisherman's Cooperative	Fishing Industry Representative
Facilitator		
Richard Stoklosa	E-Systems Pty Limited	Consultant, Ecological Risk Assessment

Persons invited to participate who declined invitation, did not respond, or otherwise unavailable on the day		
Andrew Limbourn	CSIRO	
Wayne Hosking	Brolos	
B Wilks	KFH	
Nick Catalano	Catalano Seafoods	
Dirk Slawinski	CSIRO	
Doug Coughran	Dept of Environment and Conservation WA	(provided written advice to workshop with regard to whale entanglement)
Evan Weller	CSIRO	
Glenn Hyndes	Edith Cowan University	
G Bosman	Southern Trading	
Genevieve Quirk	Greenpeace	
Gil Waller		
Guy Leyland	WA Fishing Industry Council	
Jessica Meeuwig	University of Western Australia	
Jill StJohn	Wilderness Society WA	
Jim Burford	Brolos	
Joshua Van Limbeek	DSEWPaC	
Kerry Cameron	DSEWPaC	
Norm Hall	Murdoch University	
Peter Mawson	Dept of Environment and Conservation WA	
Paul Gamblin	World Wildlife Fund	
R Debari	Westralian Seafoods	
Andrew Rowland	RecFish West	
Stephen Hood	Kailis	
Stephen Loporati	Dept of Fisheries WA	(octopus scientist, on call but not required)
Anthony Jupp		
Rob Merlino	Merlino Lobsters	
Bruce Cockman	Fisherman	
Laura Hooton	Fisherman	
Darren McTaggart	Fisherman	
James Paratore	Fisherman	
Jo Moreschi	Fisherman	
Robbie Glass	Fisherman	
Tony Jurinovich	Fisherman	
Nikki Thompson	Fisherman	
Peter Bailey	Fisherman	
Ted Dickinson	Fisherman	
Mary Ash	Fisherman	
Basil Lenzo	Fisherman	
Clint Moss	Fisherman	
Craig Darby	Fisherman	
John Newby	Fisherman	
Linda Williams	Fisherman	

Steve McCleary	Fisherman	
Terry Ash	Fisherman	
Terry Lissiman	Fisherman	
Curt Jenner	Centre for Whale Research	

Attachment 4

Department of Fisheries Western Australia Terms of Reference and Background Documents

Western Rock Lobster Ecological Risk Assessment

Hillarys 20 February 2013

CONTENTS

Ecological Risk Assessment Terms of Reference

Background Information and References

- General Overview
- Target species
- Ecology and TEPs
- Governance and Management

Current MSC conditions

2007 ERA – Hazards Assessed and Executive Summary

2005 ERA – Hazards Assessed

Attachments

1. Management changes 2008/09 through to January 2013
2. Report on the increase in whale interactions/entanglements

Western Rock Lobster Ecological Risk Assessment

Terms of Reference

Background

The aim of the Ecological Risk Assessment (ERA) is to determine the environmental hazards the western rock lobster fishery could face or pose and to comply with the Marine Stewardship Council (MSC) certification condition to undertake a full ERA on the Western Rock Lobster Fishery (WRLF) every five years.

To meet these requirements an ERA will be held on the 20 February 2013 to assess any risks / hazards that have arisen since the last ERA in April 2007. In addition, where new information indicates a need, the risks / hazards that were identified in previous ERAs (2000, 2005 and 2007) will be reassessed.

Terms of Reference

- To meet MSC conditions and requirements for conducting a five yearly ERA.
- To assess the impact of the fishery on:
 - Target species
 - By-catch
 - Ecology
 - Threatened Endangered and Protected (TEP) species
- To assess any hazards that may impact on the fishery.

Assessment methodology

To provide some continuity, it is proposed that the risk assessment methodology to be used in February 2013 is similar to that used in the 2007 ERA. The methodology will conform to the ISO 31000 accredited risk assessment system generally used by Government Departments in Western Australia. Comment on this proposal will be sought from stakeholders and Technical Panel members.

References & Background Information

Overviews

There are six documents under the major headings Target Species, Ecology and TEPs and Governance and Management that provide the most up-to-date overviews of how western rock lobster fishery issues / hazards have been dealt with by management and research since the ERA in April 2007. They are:

- Target species – Fisheries Research Report 217, Stock Assessment of the Western Rock Lobster Fishery.
- Ecology – Fisheries Research Report 236, Western Rock Lobster Ecology.
- Governance and Management:
 - Fisheries Occasional Publication 96, Governance of the Western Rock Lobster Fishery and Marine Stewardship Council Principle 3 Effective Management;
 - Fisheries Occasional Publication 95, Draft Western Rock Lobster Fishery Environmental Management Strategy November 2010 - October 2015; and
 - Western Rock Lobster Ecological Sustainable Development (ESD) report 2012 to the Commonwealth Government.

Another important source of information on the rock fishery is the annual State of the Fisheries and Aquatic Resources Reports (SOFAR), which provide:

- an annual description of the fishery and stock status,
- annual catch and where applicable fishing effort data for all sectors and zones of the fishery,
- annual assessments against performance indicators and measures that cover stock assessment, protected species and ecological effects of fishing, and
- a description of the annual management arrangements and social and economic effects.

(see <http://www.fish.wa.gov.au/About-Us/Publications/Pages/State-of-the-Fisheries-report.aspx>)

Target Species

General Overview

A number of management arrangements have been implemented to ensure sustainable fisheries management into the future. These include the legislated management changes that have occurred in the last three years in response to low puerulus settlements (see Attachment 1). The majority of these changes involved fishing effort reductions, including several reductions in unit values (pot numbers) and introductions of temporal and spatial closures. Fishing effort has been significantly lower in all seasons post 2007/08. However, increases in the length of the season in the past two seasons have caused a change in the distribution of fishing and appear to have contributed to an increase in the fishery's interaction with whales, particularly in 2012 (see details under the Ecology section sub-heading – Whale interactions and a report at Attachment 2).

For the 2009/10 season, a total allowable commercial catch (TACC) of 5,500 tonnes was set, which resulted in further effort reductions compared to 2008/09.¹ For the 2010/11 season the first phase of a quota system was implemented, with the provision of individual catch limits alongside existing input controls and a TACC of 5,500 tonnes. For the 2011/13 season, a TACC of 6,938 tonnes was set for an extended licensing period of 14 months, (i.e. 15 November 12 to 14 January 2013). In future, the season will open on 15 January and remain open all year (commencing 15 January 2013).

An Interactive Voice Response System for compliance and catch monitoring was introduced in 2011 and at the same time several input controls were removed. A new management plan has been gazetted (see Governance and Management section below), which provides for catch monitoring and other information to be provided electronically and grants discrete Zone B units to Zone A fishers. Several other consequential amendments have also been made (see Attachment 1).

Stock assessment

Overview of Stock Status

The Department of Fisheries WA (DFWA) monitor the West Coast Rock Lobster Fishery by a number of methods. These include fishery-dependent and independent monitoring of breeding stock levels and puerulus settlement. Indices of egg production in various areas of the fishery are the main indicators for assessing the health of the lobster stocks. These indices, which are based on commercial catch monitoring data, fishery independent breeding stock surveys and other information, are used to ensure the performance measures relating to the egg production index are met. DFWA also continues to monitor settlement of puerulus at a number of long-term monitoring sites across the distribution of the Fishery.²

Details of how the above indices and all the other information collected on the fishery (e.g. processors grade categories, length monitoring, tagging data, etc) are used in the stock assessment are provided in the *Stock Assessment for the West Coast Rock Lobster Fishery*. Fisheries Research Report No. 217, 226 pp, 2011 (see link below).

As part of DFWA's normal review process and the Marine Stewardship Council's annual audits and five yearly re-certification process, the fishery's stock assessment model was internally reviewed on a regular basis and externally reviewed by independent international experts in 2006 (Hall 2007), 2007, 2010 and 2011 (see links below). The reviews concluded that the current stock assessment model used by DFWA was appropriate. Some additional recommendations were made to improve the model; for instance reducing the spatial complexity, taking account of uncertainty within the model and adding some additional data sources and parameters. These recommendations have now been incorporated into the model and the stock assessment.

While awaiting their final implementation, the fishery currently operates under the rules proposed in the *West Coast Rock Lobster Managed Fishery Harvest Strategy*

¹ And even lower compared to 2007/08.

² Latest puerulus settlement figures can be found at <http://www.fish.wa.gov.au/Species/Rock-Lobster/Lobster-Management/Pages/Puerulus-Settlement-Index.aspx>

and Decision Rules Framework Proposals under a Quota Management System. Fisheries Management Paper 254, February 1, 2012 (see link below under the Harvest strategy and decision rules sub-heading).

Recreational rock lobster fishers are monitored through an annual mail survey and periodic phone diary surveys, which are conducted by the DFWA research division.

The fishery is currently meeting all of its performance measures in relation to the target stock and by-catch.

[Fisheries research report No. 217](#) - Draft Stock Assessment for the West Coast Rock Lobster Fishery (For pre-dissemination peer review only), February 2011.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

The above report provides:

- detailed information on catch and, where applicable, effort data for all sectors and regions of the fishery,
- status of target stocks including the performance of the fishery against its objectives, performance indicators and measures,
- details of stock assessment methods and modelling processes, and
- associated research and monitoring outcomes.

[Fisheries occasional publication No. 99](#) - Review of the Western Australian Rock Lobster Stock Assessment, May 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries occasional publication No. 81](#) - Western Rock Lobster International Stock Assessment and Modelling Workshop Report, August 2010.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

N. G. Hall (June 2007). *Review of the 2004 and 2005 stock assessments of the Western Rock Lobster fishery.* Centre for Fish and Fisheries Research, Murdoch University, South Street, Murdoch, Western Australia, 6150, Australia. Report for the Western Australian Department of Fisheries.

[Fisheries occasional publication No. 50](#) - Western Rock Lobster Stock Assessment and Harvest Strategy Workshop. 16-20 July 2007, August 2008.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries research report No. 234](#) - Evaluating the potential use of change-in-ratio and index removal techniques for determining harvest rates and efficiency increases in the Western Rock Lobster Fishery, June 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Harvest strategy and decision rules

See also the information under the same heading in the Governance and Management section below.

[Fisheries management paper No. 254](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Discussion Paper - West Coast rock lobster managed fishery - Harvest strategy and decision roles framework proposals under a quota management system, February 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

Low puerulus settlement

The latest puerulus settlement figures can be found at:

<http://www.fish.wa.gov.au/Species/Rock-Lobster/Lobster-Management/Pages/Puerulus-Settlement-Index.aspx>

[Fisheries occasional publication No. 104](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Western Rock Lobster Puerulus Workshop, May 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries research report No. 209](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Evaluating source-sink relationships of the western rock lobster fishery using oceanographic modelling. Final report, Fisheries Research and Development Corporation Project No. 2008/087, October 2010.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries occasional publication No. 71](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Western Rock Lobster Low Puerulus Settlement Risk Assessment. Draft report for public comment, September 2009.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries research report No. 218](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Assessing possible environmental causes behind the reduced colonisation of Western Rock Lobster puerulus collectors by a wide suite of species. FRDC project 2008/085, April 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Reproductive biology

[Fisheries research report No. 193](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Investigating Reproductive Biology Issues Relevant to Managing the Western Rock Lobster Broodstock. Final FRDC Report – Project 2003/005, June 2009. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Recreational fishing

[Fisheries research report No. 122](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Western rock lobster mail surveys of licensed recreational fishers 1986/87 to 1998/99, June 2000. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Catch sharing

See catch sharing in the Governance and Management section below.

Economics

[Fisheries occasional publication No. 60](#) - An Analysis of Maximum Economic Yield in the Western Rock Lobster Fishery, February 2009.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Ecology

General overview

Threatened Endangered Protected Species

A new Environmental Management Strategy (EMS) – November 2010 – October 2015, has been published (see under sub-heading EMS in the Governance and Management section), which addresses impacts of the fishery on TEP species, including sea lions and whales. It includes objectives, strategies, indicators and performance measures to deal with each risk and provides an assessment of the fishery against them.

Three of the performance measures for the WRLF relate to interactions with threatened endangered or protected (TEP) species. The performance measures specify that there should not be any increase in the rate of accidental capture of sea lions or interactions with turtles, whales or dolphins. Since the catch quota management system was implemented in 2010/11 the research logbooks have been replaced by a Catch and Disposal Record (CDR) form (that includes a research logbook component), which must be submitted every time lobster are landed, thus capturing data in near real time. The capture and/or interactions with protected species are reported through the CDR and reported annually in the Department's State of the Fisheries Reports (<http://www.fish.wa.gov.au/About-Us/Publications/Pages/State-of-the-Fisheries-report.aspx>)

There has been no increase in the fishery's interaction with TEP species³, except whales (see details below under the sub-heading Whale interactions).

Ecological overviews

[Fisheries research report No. 236](#) - Western Rock Lobster Ecology - The State of Knowledge; Marine Stewardship - Council Principle 2: Maintenance of Ecosystem, September 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

The above report provides information on:

- interactions with protected species,
- impacts of the fishery on the ecosystem, including a description of the research comparing closed and open areas and interaction with coral,
- habitat mapping,

³ See the State of the Fisheries and Aquatic Resources Reports at: <http://www.fish.wa.gov.au/About-Us/Publications/Pages/State-of-the-Fisheries-report.aspx>

- rock lobster movement and behaviour,
- rock lobster diet and trophic interactions, including trophic modelling, and
- climate change.

Western Rock Lobster Ecological Sustainable Development (ESD) report 2012 to the Commonwealth Department of Sustainability Environment Water Population and Community. <http://www.environment.gov.au/coasts/fisheries/wa/rocklob/application-2012.html>

Environmental management strategy

[Fisheries occasional publication No. 95](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Draft Western Rock Lobster Fishery Environmental Management Strategy November 2010 - October 2015, April 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Effects of Fishing

The latest research results from the comparison between fished and unfished areas in deep water off Jurien Bay on the central west coast will be presented at the Effects of Fishing Advisory Group meeting on 19 February 2013.

[Fisheries research report No. 199](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - The effect of western rock lobster fishing on the deepwater ecosystems of the west coast of Western Australia. Final FRDC Report, Project 2004/049., February 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries occasional publication No. 91](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - A Report of the Effects of Fishing Advisory Group (EFAG) Meeting (2 - 3 November 2010) and The Western Rock Lobster Ecological Effects of Fishing Research Plan Revised and Updated by the Effects of Fishing Advisory Group (2 -3 November 2010), November 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries occasional publication No. 53](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Proceedings of the Western Rock Lobster Ecological Effects of Fishing Workshop. 8-10 August 2007, November 2008. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Abrolhos Islands – habitat and management

There are three major issues regarding the Abrolhos Is:

- Possible impact of a twelve month fishing season on the terrestrial fauna of the Abrolhos Islands. An update will be provided at the meeting.
- Sensitive habitats – Research is continuing on the possible impact of rock lobster fishing on sensitive habitats at the Abrolhos Is. An update will be provided at the meeting.
- Effluent and rubbish – A waste management plan has been implemented. An update will be provided at the meeting.

[Fisheries research report No. 237](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Mapping shallow water habitats of the Wallaby Group, Houtman Abrolhos Islands, using remote sensing techniques, October 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries management paper No. 220](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Management of the Houtman Abrolhos system - A draft review 2007 - 2017, February 2007. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries research report No. 134 - V2](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Towards an assessment of the natural and human use impacts on the marine environment of the Abrolhos Islands. Volume 2: Strategic research and development plan, March 2002. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries research report No. 134 - V1](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Towards an assessment of the natural and human use impacts on the marine environment of the Abrolhos Islands. Volume 1: Summary of existing information and current levels of human use, April 2002. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Climate change and habitat monitoring

[Fisheries research report No. 213](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Fisheries-dependent indicators of climate change in Western Australia (WAMSI Sub-project 4.2.3), December 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries research report No. 183](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Development of a long-term program to monitor coastal communities within the Swan region, February 2009. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Dusky whaler sharks and bait bands

A state-wide ban on plastic bait bands onboard all fishing boats operating in WA waters was implemented on 15 November 2011. This ban should reduce to negligible, the risk of dusky whaler sharks becoming entangled in discarded plastic bands due to the rock lobster fishery or any other commercial fishing operation in WA. For further details see the western rock lobster Ecological Sustainable Development (ESD) report 2012 to the Commonwealth Department of Sustainability Environment Water Population and Community.

<http://www.environment.gov.au/coasts/fisheries/wa/rocklob/application-2012.html>

[Fisheries research report No. 151](#) - Biology and stock assessment of the thickskin (sandbar) shark, *Carcharhinus plumbeus*, in Western Australia and further refinement

of the dusky shark, *Carcharhinus obscurus*, stock assessment. Final FRDC Report – Project 2000/134, December 2005. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

Sea lions

The introduction of sea lion exclusion devices (SLEDs) in November 2006 for both commercial and recreational rock lobster pots around the mid west coast sea lion breeding colonies (between north of Freshwater point and South of Wedge Island) has reduced the ecological risk to sea lions (in particular sea lion pups drowning in pots) in this area to low. In addition two new SLED zones within the Abrolhos Island area (Pelsaert and Easter Group Islands) were implemented on 15 March 2011 to protect the sea lion pups in these breeding areas (see the Environmental Management Strategy and Ecologically Sustainable Development reports below for further details).

Whale interactions

The significant reduction in rock lobster fishing effort (pots in the water) that took place between 2008/09 and 2010/11 in response to a number of low puerulus settlement years, combined with the fishery's move towards quota management in 2009/10 and 2010/11, reduced the number of whale entanglements recorded in 2009 and 2010. However, there has been a significant increase in whale entanglements on the WA coast in the past two years due to all types of fishing gear. The Department of Environment and Conservation's Cetacean Database reports four entanglements in 2010, nine in 2011 and twenty-four in 2012. Rock lobster fishing gear was identified as responsible for eight of the entanglements in 2011 and thirteen in 2012.

The whale populations migrating along the west coast have increased significantly since the moratorium on whaling in Australian waters in 1978 and internationally in 1986.⁴ However, it appears that the changes in fishing behaviour associated with extensions to the season in recent years have had the most significant impact on the number of entanglements, particularly during 2012. DFWA has prepared a report on the issue (see Attachment 2) and is currently consulting with the fishing industry to develop mitigation measures to deal with it.

Governance and Management

Governance and MSC Principle 3

[Fisheries occasional publication No. 96](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Governance of the Western Rock Lobster Fishery and Marine Stewardship Council Principle 3 Effective Management, April 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

The above report provides, amongst other things, a description of the fishery and information on:

- details of the governance framework for the fishery,
- independent ecological risk assessments,
- ecosystem based fisheries management policies,

⁴ For example, Humpback whales (Breeding Stock D) are expected to return to pre-whaling levels by 2020.

- the process for allocation and reallocation of catch shares,
- consultation roles and responsibilities,
- long term and fishery specific objectives,
- decision making processes,
- compliance and enforcement, and
- monitoring and management performance evaluation.

Management and Management Plans

See Attachment 1 for a summary of the management changes from 2008/09 to January 2013

The current consolidated management plan, which is valid until 14 January 2013, can be viewed through the State Law Publisher's website at:

[http://www.slp.wa.gov.au/statutes/subsidiary.nsf/0/37FEC97A3FE33BD2482579DF002CDBE9/\\$file/53+wcl+13-04-12.pdf](http://www.slp.wa.gov.au/statutes/subsidiary.nsf/0/37FEC97A3FE33BD2482579DF002CDBE9/$file/53+wcl+13-04-12.pdf).

The new quota management plan, which will come into force on 15 January 2013, can also be viewed through the State Law Publisher's website at:

[http://www.slp.wa.gov.au/gazette/gazette.nsf/gazlist/798980909FF0A04648257A990042B081/\\$file/gg187.pdf](http://www.slp.wa.gov.au/gazette/gazette.nsf/gazlist/798980909FF0A04648257A990042B081/$file/gg187.pdf)

[Fisheries management paper No. 257](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Draft management plan for the West Coast Rock Lobster Managed Fishery, July 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries management paper No. 255](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Discussion Paper - Operational and compliance elements of a new management plan for the West Coast rock lobster managed fishery, February 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries management paper No. 253](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Discussion Paper - Licensing and allocation under a new management plan for the West Coast rock lobster managed fishery, February 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

Harvest strategy and decision rules

The draft harvest strategy and decision rules framework (HSDR) for the fishery (cited below) was used to determine the TACCs for the 2013 season. However, because industry has not formally agreed to adopt the proposed HSDR, a revised document will be drafted by DFWA in early 2013 and, following Ministerial approval, will be released for public comment. It is intended that the revised HSDR will discuss in more detail some of the principles around TACC setting, as well as providing indicative TACCs for future seasons under different scenarios (Legal Proportion Harvested (LPH), removal of setose and maximum size rules etc.). The stock assessment model will be updated in March 2013 with the most recent biological data (breeding stock, puerulus, etc) to provide the information for the scenarios.

Following the end of the consultation period the final HSDR will be sent to the Minister for his approval. If it is approved, it is proposed that the Department develop a draft Ministerial Policy Guideline (MPG) for TACC setting for the West Coast Rock Lobster Fishery. This MPG would be a simplified version of the HSDR, focusing on the mechanics of TACC setting and the procedures that would be required to be followed prior to finalising advice to the Minister for his decision. If adopted, the MPG will then be used as a “rule book” to set the TACCs for the 2014 season. It is envisaged that the HSDR will be implemented prior to November 2013.

[Fisheries management paper No. 254](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Discussion Paper - West Coast rock lobster managed fishery - Harvest strategy and decision roles framework proposals under a quota management system, February 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries occasional publication No. 79](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - A Sea Change for Aquatic Sustainability - Meeting the challenge of fish resources management and aquatic sustainability in the 21st Century, June 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Ecological Risk Assessments

Three major issues were identified in the 2007 ERA report (see the reports executive summary below under the heading 2007 ERA – Hazards Assessed):

- Fishery efficiency gains. This is dealt with under Target Species. The fishery has now moved to quota management, whereby estimating efficiency gains are no longer a priority for improving the stock assessment.
- Central west coast and Kalbarri–Big Bank deep-water ecological communities. The hazards of fishing activity interactions with deep-water ecological communities have been assessed (see links under the sub-headings Ecological Overviews and Effects of Fishing in the Ecology section above). On going research of fished and unfished areas in deepwater off Jurien Bay on the central west coast are continuing and a full briefing will be provided at the Effects of Fishing Advisory Group meeting on 19 February 2013.

[Fisheries occasional publication No. 56](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Western Rock Lobster Ecological Risk Assessment, November 2007. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries management paper No. 203](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Western Rock Lobster Fishery Ecological Risk Assessment 2005 Report, July 2005. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries occasional publication No. 63](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Western Rock Lobster Ecological Risk Assessment 2001. Published, March 2009. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Environmental Management Strategies (EMS)

[Fisheries occasional publication No. 17](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Western Rock Lobster Environmental Management Strategy. July 2002 - June 2006, March 2005.

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

[Fisheries occasional publication No. 95](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Draft Western Rock Lobster Fishery Environmental Management Strategy November 2010 - October 2015, April 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

The above report provides information on how management has responded to target stock, TEP species and ecological issues and risks identified in the 2007 ERA. It also provides details on two newly identified risks:

- Low puerulus settlement – two workshops / risk assessments have been undertaken on the low puerulus settlements that commenced in 2008/09. See the General Overview and links to reports under the sub-heading Low Puerulus Settlement in the Target Species section above.
- Sea lions at the Abrolhos Is – ongoing research in 2009 indicated that seal lion pups at breeding locations in the Abrolhos Is were at risk from drowning in rock lobster pots. On 15 March 2011, sea lion exclusion devices were made mandatory for pots fished in the risk areas around the Southern and Easter Island Groups where the sea lions breeding colonies are found (see the Ecologically Sustainable Development report below for further details).

Ecologically Sustainable Development (ESD)

Western Rock Lobster Ecological Sustainable Development (ESD) report 2012 to the Commonwealth Department of Sustainability Environment Water Population and Community. <http://www.environment.gov.au/coasts/fisheries/wa/rocklob/application-2012.html>

[Fisheries management paper No. 157](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Policy for the implementation of ecologically sustainable development for fisheries and aquaculture within Western Australia, March 2002. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

Ecologically Based Fisheries Management

[Fisheries research report No. 235](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - National Application of Sustainability Indicators for Australian Fisheries- Part 2: Ecosystem based frameworks for aquaculture, multi-fishery and international applications, July 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries research report No. 225](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Ecosystem Based Fisheries Management case study report West Coast Bioregion, November 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries research report No. 215](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Development of an ecosystem approach to the monitoring and management of Western Australian fisheries FRDC Report - Project 2005/063, January 2011. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries research report No. 194](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx) - Conceptual models for Ecosystem Based Fisheries Management (EBFM) in Western Australia, August 2009. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

[Fisheries management paper No. 157](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Policy for the implementation of ecologically sustainable development for fisheries and aquaculture within Western Australia, March 2002. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries occasional publication No. 82](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Tactical Research Fund - ASFB 2009 Workshop - Biodiversity of aquatic ecosystems: What to measure and monitor for fisheries and ecosystem management, October 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Catch Sharing

[Fisheries management paper No. 248](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Developing mechanisms for the transfer and/or adjustment of rock lobster shares between sectors in Western Australia and South Australia - FRDC Project No. 2007/050, May 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries management paper No. 236](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Considerations for the implementation of western rock lobster sectoral allocations - A document prepared by the Integrated Fisheries Allocation Advisory Committee, January 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries management paper No. 238](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Discussion Paper - Potential reallocation mechanisms for the transfer and/or adjustment of catch shares between sectors with application to the Western and South Australian rock lobster fisheries, January 2010. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries management paper No. 200](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Integrated Fisheries Management. Draft Allocation Report - Western Rock Lobster Resource, October 2005. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries management paper No. 192](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - Integrated Fisheries Management Report Western Rock Lobster Resource, February 2005. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

[Fisheries occasional publication No. 21](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Allocation of the Western Rock Lobster Resource between user groups, June 2005. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Deep Sea Crabs

[Fisheries management paper No. 259](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx) - West Coast Deep Sea Crustacean Managed Fishery Draft Management Plan 2012, October 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Management-Papers.aspx>

Research Monitoring and Assessment

[Fisheries occasional publication No. 106](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx) - Research, Monitoring, Assessment and Development Plan 2011 -2012, March 2012. <http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

Current Marine Stewardship Council conditions

(The full MSC certification report can be found at: <http://www.msc.org/track-a-fishery/certified/south-atlantic-indian-ocean/western-australia-rock-lobster>)

Target species:

Harvest control rules.

1.2.2: There are well defined and effective harvest control rules in place.

Score 75

Condition 1.2.2:

By the 2nd annual surveillance audit the client shall provide control rules that are “well defined”.

Note: The second annual audit of the fishery is scheduled for November 2013.

1.2.3: Relevant information is collected to support the harvest strategy.

Score 75

Condition 1.2.3

By the 2nd annual surveillance audit the client shall provide evidence on how the information that is currently collected is used to inform/assess the formal control rules developed as part of condition 1.2.2.

The Department of Fisheries has until November 2013 to implement the harvest control rules for the fishery. A management and consultation process has been put in place to progress this issue so that the MSC’s conditions will be met by November 2013. See the information above under the Governance and Management section, sub-heading Harvest strategy and decision rules and the links to the report.

Ecology

Ecological impacts:

2.4.3: Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types.

Score 70

Condition 2.4.3:

By the 2nd annual surveillance audit the client shall provide evidence to the CB, that sufficient reliable information on the spatial extent of the fishery has been collected to identify the nature of the impacts of the fishery on different habitat types. In order to do so the client shall provide information on the spatial extent of both the key habitats and the associated fishing effort.

Information on the spatial extent of the fishery and nature of the impacts of the fishery on different habitat types can be found in *Western Rock Lobster Ecology – The State of Knowledge*, Fisheries Research Report July 2012 at

<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx>

2007 ERA – Hazards Assessed and Executive Summary

Table 1. Hazards from the 2005 ERA relevant to ERAEF Level 2 analysis.

2005 ERA Ref No.	Hazard identified in the 2005 ERA	Internal or external threat	Ecological component	Direct capture or other interaction
3	Efficiency changes	Internal	Target species	Direct capture
4	Mortality, productivity loss from handling	Internal	Target species	Direct capture
7	Octopus	Internal	By-catch species	Direct capture
8	Scalefish and sharks	Internal	By-catch species	Direct capture
10	Whales	Internal	TEP species	Direct capture
12	Sea lions	Internal	TEP species	Direct capture
14	Sea turtles	Internal	TEP species	Direct capture
19	Abrolhos ecosystem	Internal	Community	Direct capture
20	Leeuwin – Naturaliste	Internal	Community	Direct capture
21	Central west coast – shallow	Internal	Community	Direct capture
22	Central west coast – deep	Internal	Community	Direct capture
23	Kalbarri – Big Bank	Internal	Community	Direct capture
25	Benthic biota	Internal	Habitat	Direct capture
30	Marine issues – Abrolhos water quality	External	Community	Other interaction
32	Bait bands – Dusky whalers	Internal	By-catch species	Other interaction

EXECUTIVE SUMMARY

An ecological risk assessment (ERA) was undertaken in 2005 in support of MSC re-certification of the commercial Western Rock Lobster (WRL) fishery. Following the 2005 ERA, the certifying body—Scientific Certification Systems Inc (SCS)—advised that an improved ERA was needed for meeting the requirements of MSC re-certification.

In particular, SCS required re-assessment of the ecological hazards identified in the 2005 ERA, ranked by at least one person as ‘moderate’ risk or above, using the ‘Ecological Risk Assessment for Effect of Fishing’ (ERAEF) methodology developed jointly by CSIRO Marine and Atmospheric Research, and the Australian Fisheries Management Authority (AFMA). This requirement is reflected in a formal condition of re-certification.

A workshop procedure was developed in consultation with CSIRO research scientists involved in the development of the ERAEF methodology, and proposed to SCS (as the certifying body) as an intermediate step to gain an improved understanding of ecological risk before proceeding to a Level 2 ERAEF analysis. It was agreed by the Department of Fisheries and the Western Australian Fishing Industry Council (WAFIC) to adopt this alternative approach, with the aim of carrying any hazards still assessed as ‘moderate’ risk or above in this 2007 ERA to the Level 2 ERAEF analysis.

A workshop procedure was distributed widely to all stakeholders in November 2006 whilst canvassing the availability of independent experts for proposed workshop dates. Based on the availability of technical experts and stakeholders, numerous

technical documents were distributed on CD-ROM six weeks prior to the workshop date (2-3 April 2007), and made available to all stakeholders on the WAFIC website four weeks in advance of the workshop.

The ERA undertaken on 2-3 April 2007 resulted in detailed outcomes which were documented in the risk assessment workshop record and communicated to all participants. All of the 15 'moderate' risk hazards on the agenda were assessed using a consultative and structured workshop procedure. Consensus was reached on the expert judgements of a Technical Panel in this qualitative ERA.

Eleven of the 15 hazards were ranked 'low' or 'negligible' risk under present circumstances. Ongoing performance monitoring of the fishery and management controls should be used to confirm that the risk rankings do not increase.

The ERA of the Western Rock Lobster fishery revealed four 'moderate' risks. Risk management actions are in progress for three of the moderate risks (refer to Recommendations 1 and 2 below). One of the moderate risks to a by-catch species was subject to further assessment under a Level 2 ERAEF analysis, which yielded further information to characterise risk and propose management actions (Recommendations 3, 4 and 5).

The suggested risk management actions are documented for consideration by the Western Australian Department of Fisheries and WAFIC. For each of the four moderate risks under existing management controls, the following recommendations were made:

Recommendation 1: No further risk assessment of fishery efficiency gains to the target species is recommended at the present time, pending a commitment of WRL fishery managers to improve estimates of efficiency gains and take them into account in the management of the fishery. An ERAEF Level 2 assessment would not be expected to add value to the management of this hazard, as it would not provide any additional information that might change the recommended action.

Recommendation 2: No further risk assessment of hazards to the central west coast or Kalbarri–Big Bank deep-water ecological communities is recommended in the short term. The hazards of fishing activity interactions with deep-water ecological communities has been assessed in an EcoSRG workshop (August 2007, chairman's report in preparation), which recommended ongoing research of fished and unfished areas. If new information becomes available as a result of future research, the risk level should be reviewed and validated by the WA Department of Fisheries and WAFIC in consultation with independent experts.

Recommendation 3: No further risk assessment of bait band entrapment hazards to the by-catch species *Carcharhinus obscurus* (Dusky whaler shark) is recommended in the short term.

Recommendation 4: Alternatives to bait bands, to avoid the use of materials that can entangle *C. obscurus* and other by-catch species, should be investigated as a matter of improving environmental management of the Western Rock Lobster fishery. If the bait band hazard is eliminated, no other specific actions would need to be taken by the Western Rock Lobster fishery to avoid impacts to this species.

Recommendation 5: If bait bands continue to be taken to sea by the Western Rock Lobster fishery, on-going stock assessments of *C. obscurus* should consider the threat of mortality due to bait band interactions, and investigate methods for collecting data to monitor any increased mortality with a high level of confidence.

It is important to note that the interaction of bait bands with *C. obscurus* can be attributed to a number of fisheries which utilise bait bands aboard vessels, not solely the Western Rock Lobster fishery. If this risk is considered unacceptable, management actions to reduce or eliminate the exposure of marine fauna to bait bands should apply to all users of the marine environment.

For the full 2007 ERA report see [Fisheries occasional publication No. 56](#) - Western Rock Lobster Ecological Risk Assessment, November 2007.
<http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Occasional-Publications.aspx>

2005 ERA Hazards Assessed

SECTION 3. ERA RESULTS

Part 6. Hazards

This section provides the full listing of hazards/issues identified by the stakeholder workshop and those identified during the previous risk assessment process. The hazards identified in these workshops were cross-referenced to hazards identified in the previous risk assessment (Table 6.1). For some of the hazards, the participants developed a conceptual model or component tree to describe better the nature of the hazard. Stakeholders developed these diagrams for risks they considered to be the most important.

Table 6.1. List of hazards identified during stakeholder workshop (workshop 1) and the associated risk assessment (workshop 2). The table cross-references the hazards to the sections where they are described in more detail, and to the ranking they were assigned in 2001 (if they were identified previously). The current median score is shown in bold face. The range of scores is shown in parentheses. These scores are presented and analysed later, including a discussion of their associated justifications. For several of the extreme scores (low and high), participants provided no specific justification (e.g., effects on the Central West Coast shallow environment).

Hazard	Section	2001 rating	2005 rating
1. Possibility that estimate of egg production is incorrect (effect on spawning biomass)	6.1.1	MODERATE	(low to) MODERATE
2. Increasing recreational fishing population (effect on spawning biomass)	6.1.3	MODERATE	LOW (to high)
3. Increase in fishing efficiency - shift to campaign fishing (effect on spawning biomass)	6.1.4	New hazard	MODERATE (low to extreme)
4. Mortality and loss of productivity from handling undersized and setose individuals (effect on spawning biomass)	6.1.5	LOW	LOW (to moderate)
5. Market decline and additional pressure of the resource (effect on spawning biomass)	6.1.6	New hazard	LOW (to moderate)
6. Effects of fishing on the genetic structure of the lobster population	6.1.2	New hazard	LOW (to moderate)
7. Removal of octopus (bycatch)	6.2.1	LOW	LOW (to moderate)
8. Removal of scale fish and sharks (bycatch)	6.2.2	LOW	LOW (to moderate)
9. Removal of deep sea crabs (bycatch)	6.2.3	LOW	LOW
10. Whale entanglements in pot	6.3.1	LOW	LOW

ropes (ecological impact)			(to moderate)
11. Whale entanglements in pot ropes (social impact)	6.3.1	New hazard	MODERATE (low to extreme)
12. Sea lion mortality in pots (without management)	6.3.2	MODERATE	MODERATE (low to extreme)
13. Sea lion mortality in pots (with management)	6.3.2	New hazard	LOW (to moderate)
14. Sea turtles	6.3.3	MODERATE	LOW (to moderate)
15. Manta rays	6.3.4	LOW	LOW
16. Moray eels	6.3.5	LOW	LOW
17. Sea horses	6.3.6	New hazard	LOW
18. Uncertainty in bycatch data	6.3.7	New hazard	LOW (to moderate)
19. Effect of fishing on the Abrolhos environment	6.4.1a	New Hazard	LOW (to high)
20. Effect of fishing on the Leeuwin-Naturaliste environment	6.4.1b	New hazard	LOW (to moderate)
21. Effect of fishing on the Central west coast shallow environment (including coastal development)	6.4.1c	New hazard	MODERATE (low to high)
22. Effect of fishing on the Central west coast deep environment	6.4.1d	New hazard	(low to) MODERATE
23. Effect of fishing on the Kalbarri – Big Bend environment	6.4.1e	New hazard	LOW (to moderate)
24. Ghost fishing	6.4.2	LOW	LOW
25. Fishing effects (pots and boats) on benthic biota (coral, limestone reefs, seagrass)	6.4.3	MODERATE	LOW (to moderate)
26. Effects on other fisheries of demand for bait	6.4.4	New hazard	LOW (to moderate)
27. Introduction of diseases or pathogens in bait	6.4.5	LOW	LOW (to moderate)
28. Changes in behaviour of attendants (birds, dolphins, sharks, sea lions, sea lice)	6.4.6	LOW	LOW
29. Illegal feeding of dolphins	6.4.7	LOW	LOW
30. Abrolhos Is marine issues	6.4.8		LOW (to moderate)
31. Abrolhos Is terrestrial bio-security	6.4.9		LOW (to moderate)
32. Dusky whaler shark entanglement in bait bands	6.4.10	LOW	LOW (to moderate)
33. Trawling effects on seagrass	6.5.1	New Hazard	LOW
34. Effects of aquaculture	6.5.2	New Hazard	LOW

35. Oil spills	6.6.1	New Hazard	LOW
36. Climate change	6.6.2	New Hazard	LOW (to moderate)
37. Jurisdictional issues	6.7.1	New Hazard	LOW (to moderate)

Table 6.2. List of hazards identified during first and second ecological risk assessment processes for which there was consensus among the expert group at the second workshop that the hazard was low and no further investigation or analysis was warranted.

Hazard	Section	Rating
Contributions to climate change	6.6.2	LOW
Additional food from bait in pots	6.4.1	LOW
Impacts on cormorant population	6.4.6	LOW
Addition of nutrients to the system	6.4.1	LOW
Removal of lobster biomass and effect on sea lions – loss of food	6.4.1	LOW
Disease introduction to dolphins		LOW
Removal of baldchin, dhufish and cod	6.2.2	LOW
Dolphin entanglement in pot ropes	6.3.1	LOW
Plastic ingestion / entanglement of marine spp.	6.4.10	LOW
No ecological baseline due to absence of closed areas	6.4 / 6.4.1	LOW
Reduction of food source resulting from intensive fishing of whites migration	6.4 / 6.4.1	LOW
Presence of oil fields	6.4 / 6.4.1	LOW
Coastal development	6.4 / 6.4.1	LOW

Attachment 1

SUMMARY OF LEGISLATED CHANGES IN THE WEST COAST ROCK LOBSTER FISHERY FROM 2008/09 SEASON TO 2013.

2008/09	<p>15 November – Effort reduction: unit values (number of pots per unit) of Zone A – 0.66 Zone B – 0.66 Zone C – 0.74</p> <p>Sunday closure for all zones and all season with the exception of the first two weeks in Zone A</p> <p>30 November – Effort reduction: unit values (number of pots per unit) of Zone A – 0.54 Zone B – 0.54 Zone C – 0.62</p> <p>24 February – Closure of Big Bank for the remainder of the season</p> <p>1 March – Effort reduction: unit values (number of pots per unit) of Zone A – 0.42 Zone B – 0.42 Zone C – 0.50</p> <p>6 March – Saturday and Monday closures for all zones and all season Sunday closure for the first two weeks of Zone A continuing all season Removal of Zone C moon closures</p> <p>15 March – Maximum size of female lobsters in Zone A and B reduced to 95mm Minimum size in Zone C increased to 77mm</p> <p>1 May – back to 5 fishing days per week (Saturday and Sunday closures)</p>
2009/10	<ul style="list-style-type: none"> • Effort reduction: unit values (number of pots per unit) of: Zone A – 0.36 Zone B – 0.40 Zone C – 0.44 • Temporal closures: Zone A – 4 days a week all season Zone B & C – 4 days a week during “whites” and “reds” peaks (December 1 to December 31 and March 15 to April 14) Zone B & C – 5 days a week for rest of the season • Changes in maximum female size: Zone A & B – 105mm to 95mm Zone C – 115 mm to 105 mm Minimum size of 77mm all season • All pots must have at least three escape gaps 55 mm high and 305 mm wide • Total Allowable Commercial Catch (TACC) of 5,500 tonnes set for the 2009/10 season. • removal of soaking periods prior to the start of the season (provision made to load and bait pots and move in the Fishery 7 days before the start of the season) • Big Bank to remain closed • Rock Lobster processors to submit weekly catch (only) returns, to be received by the Department no later than COB Tuesday, each week of the season (in addition to monthly reporting requirements) • Carrier boats permitted to carry more than 4 rock lobster pots. <p>December 2009</p>

	<ul style="list-style-type: none"> • prohibit fishing in Zone B between 25 December 2009 and 10 January 2010 inclusive; • continue the prohibition on fishing on Friday, Saturday and Sunday each week throughout the remainder of the first half of the season catch target period in Zone B; • prohibit fishing in Zone C between 25 December 2009 and 3 January 2010 inclusive; and • B Zone summer closures removed. <p>January 2010</p> <ul style="list-style-type: none"> • Closure in Zone B extended to 25 January; and • Prohibit fishing in Zone C between 16 January and Prohibit fishing on Fridays in Zone C from 1 Feb to end of season. <p>February 2010</p> <ul style="list-style-type: none"> • Prohibit fishing in Zone C between 12 March and 21 March Change unit value to 0.30 for Zone C effective 21 March; • Zone A prohibited from fishing in Zone B for the remainder of the season as of 15 February 2010; and • Prohibit fishing in Zone B between 12 March and 11 April. <p>17 February 2010</p> <ul style="list-style-type: none"> • Zone B permitted to fish Friday's for the remainder of the season. <p>May 2010</p> <ul style="list-style-type: none"> • Zone C closed for the remainder of the season – effective 10 May; and • Zone A closed for the remainder of the season – effective 17 May. <p>June 2010</p> <ul style="list-style-type: none"> • Zone B closed for the remainder of the season – effective 15 June
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2010/11	<ul style="list-style-type: none"> • Total Allowable Commercial Catch (TACC) of 5,500 tonnes set for the 2010/11 season. • Individual catch limits introduced with the following number of kilograms per unit: <ul style="list-style-type: none"> Zone A – 36kg from 15 November to 14 March Zone A – 51kg from 15 March to end of season Zone B – 81kg for entire season Zone C – 75kg for entire season • Fishing prohibited on weekends until late June 2011 • Big Bank to remain closed • Introduction of a 14 nm² closed area in deep water for research purposes • Season extended to 31 August • Zone C start date moved from 25 November to 15 November • 20 fathom rule removed • Introduction of crate tags, catch and disposal records, registered receivers, approved landing areas, holding over book and catch weighing procedures to monitor fishers' catch • Limited “within-season” transferability of licences and entitlement. • Implementation of two new additional sea lion exclusion devices (SLED) zones within the Abrolhos Island area (Pelsaert and Easter Group Islands)
2011/12	<ul style="list-style-type: none"> • TACC of 6,938 tonnes set for extended licensing period 1 October 2011 to 14 January 2013 • This equates to the following catch limits per unit: <ul style="list-style-type: none"> Zone A (in Zone B) – 52kg from 15 November to 14 March and 1 July to 30 September Zone A – 48kg from 15 March to 30 September Zone B – 96kg for entire season Zone C – 102kg for entire season • Zone A fishers permitted to return to Zone B after 30 June following nomination • Weekend, Xmas and New Year closures removed • Season extended 30 September • Full transferability of licences and entitlement • Interactive Voice Recording System for compliance and catch monitoring introduced • Reduction in minimum unit holding from 63 to 60 units of entitlement
15 January 2013 onward	<ul style="list-style-type: none"> • A new management plan that will move the Fishery to quota management was published in the Government Gazette on 17 October 2012⁵. The new plan will come into effect on 15 January 2013. • Season open twelve months of the year.

⁵ A copy of the new West Coast Rock Lobster Managed Fishery Management Plan can be found at: [http://www.slp.wa.gov.au/gazette/gazette.nsf/gazlist/798980909FF0A04648257A990042B081/\\$file/gg187.pdf](http://www.slp.wa.gov.au/gazette/gazette.nsf/gazlist/798980909FF0A04648257A990042B081/$file/gg187.pdf)

Attachment 2

Whale Entanglements in the western rock lobster fishery and other W.A. fisheries

Background

Each year the western rock lobster fishery (WRLF) interacts with migrating humpback whales (*Megaptera novaeangliae*) and southern right whales (*Eubalaena australis*). The interactions consist of entanglements with pot ropes and boat strike. Historically, direct interactions have ranged from between none and four each season with this range having become a key performance indicator (KPI) for the fishery being one of the criteria used to determine the approval of the fisheries export license from the Commonwealth Government (SEWPaC). Specifically this KPI is described as “... *that there is no increase in the rate of interactions with whales and dolphins (entanglements).*”

It was recognised at the time the acceptable range was developed that the rate of whale interactions was likely to increase through time given the increasing numbers of whales migrating along the west coast. The recent level of interactions has however increased well above the KPI level with reports for the current year (to September 2012) being the greatest number in the time-series which began in 1990. Although not presented separately by fishery, Figure 1 provides an illustration of this recent increase.

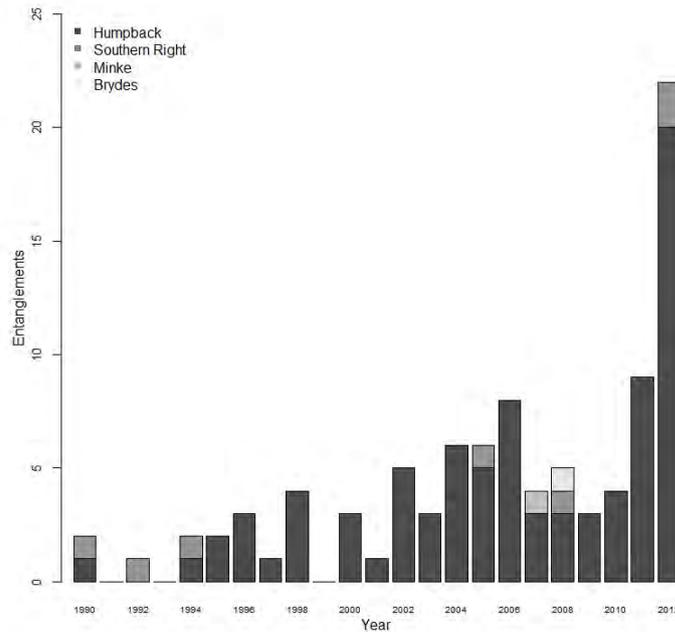


Figure 1 Entanglements of whales in fishing gear off Western Australia (updated from Groom and Coughran *in press*). 2012 data up to September.

The majority of fishing gear interactions are with WRLF gear, and hence, entanglements are likely to remain high under the current fishing patterns (winter fishing) of the WRLF and population growth of W.A. Humpback whales (see below). A code of practice for the WRLF to reduce whale entanglements was introduced in 2007 highlighting the need for fishers to reduce slack rope of the surface, not set pots in clusters and to regularly check pots among other initiatives. This, along with the reductions in fishing effort that occurred during 2007 – 2010 probably resulted in the observed reductions in entanglements across this period (Figure 2). However, with the recent change in fishing patterns and concomitant increase in entanglements additional mitigation measures are likely to be needed to reduce entanglement rates.

Western Australia Humpback Population

Humpback whales are involved with the majority (~90%) of entanglements in Western Australia (Figure 1), due their more coastal migration pattern and their overall morphology (Groom and Coughran *in press*). Humpbacks have long pectoral fins which are “knobbly” (Clapham and Mead 1999), which increase their likelihood of entanglement. The population of humpback whales (Breeding Stock ‘D’) that migrates along the west coast of Australia is the largest population of humpbacks whales in the southern hemisphere (Leaper et al. 2008). The population size is

estimated to continue to grow until 2020 where it is predicted to return to pre-whaling levels (Johnston and Butterworth 2009).

The temporal and spatial knowledge of this migration comes from whaling data, photographic data and both aerial and boat surveys. These data have been summarised by Jenner et al. (2001), which revealed a northern migration along the coast starting around the “Capes” in June, continuing north through until August. By the end of August, the majority of whales surveyed off Point Cloates (Ningaloo) were undertaking their southern migration (Chittleborough 1953), which extends through to November. There appears to also be a sexual segregation in the timing of both the northern and southern migrations, especially for those females that are pregnant or with calf: The latter group tend to migrate after the males in both the northern and southern migrations (Chittleborough 1965). Spatially, there appears to be a difference between the northern and southern migrations with the northern migration tending to be further offshore, while the southern migration is more coastal (see Jenner et al. 2001)

Entanglements of whales with western rock lobster fishery

The northern migration of humpback whales along the WA coast coincides with the ‘traditional’ end of the western rock lobster fishery (June 30). Just over half of all reported whale entanglements are associated with rock lobster pots, however there are also entanglements associated with aquaculture and other pot based fisheries (crab and octopus) (Groom and Coughran *in press*). Analysis of entanglement rates with WRLF gear has shown an increase since recording began back in the early 1990’s (Groom and Coughran *in press*). Entanglements rates did drop between 2006 and 2010 (Figure 2), which, as outlined above, was probably the result of the introduction of industry codes of conduct for a range of fisheries to reduce the likelihood of interactions (Groom and Coughran *in press*), as well as significant reductions in pot lifts within the WRLF during this time (de Lestang et al. 2011) (Figure 2).

However, over the last few seasons (2010/11 and 2011/13) there have been significant changes to the management arrangements for the western rock lobster fishery. The move to quota-based management has included a change to season length with the season extending until the end of August in 2011 and September in 2012. The 2013/14 season is due to be the first season with no temporal closure, allowing fishing to occur year round.

The extension of the season has led to a movement of fishing effort more into months when the humpback migration occurs, resulting in a significant increase in the number of whale entanglements in fishing gear, and predominantly lobster fishing gear (Figure 1). While there are more pots being fished in the winter months, the number of days that the pots remain in the water is also important (Figure 2).

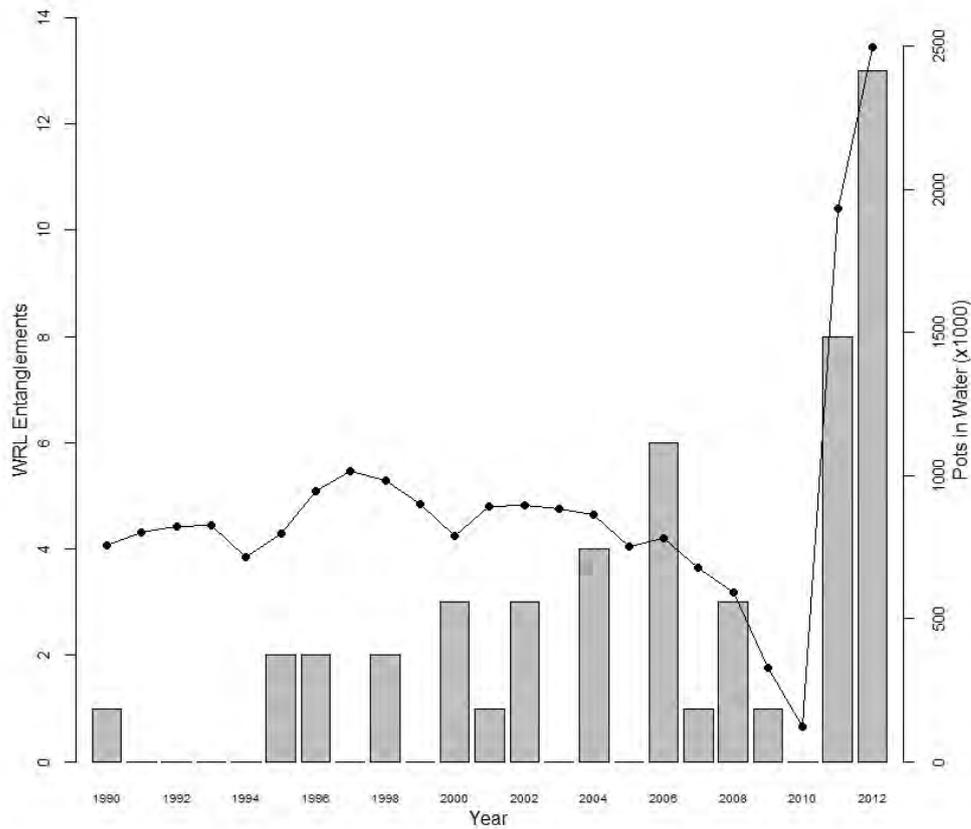


Figure 2. Entanglements in confirmed WRL gear (bars) and the number of pots being fished multiplied by no. of days in the water (points and line) during the winter months (May-Oct inclusive).

In 2012 there have been 22 entanglements of humpbacks in fishing gear to September (Figure 1), with 13 of these being confirmed as WRLF gear (Figure 2). Previously entanglements have occurred predominantly in June (Figure 3) as the season finished on 30 June until 2010. It should be noted that these are the dates at which the entangled whale was spotted, and may represent some period of time after the entanglement actually occurred. In the last two years, with the increase of pots in the water in later months (Figure 2), the number of recorded entanglements has moved to more entanglements in these later months (Figure 3).

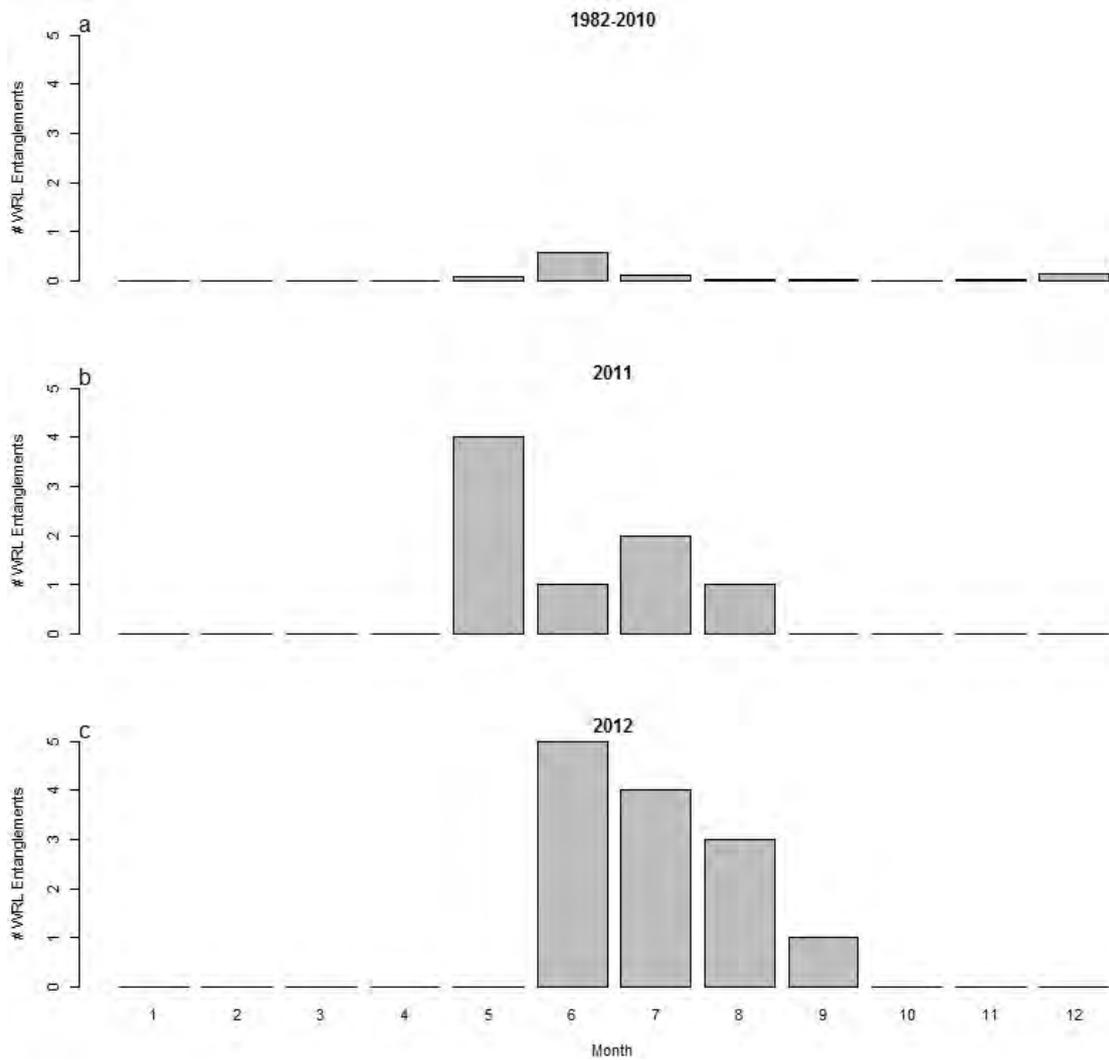


Figure 3 –Number of WRL entanglements per year by month for the periods a) 1982-2010; b) 2011 and c) 2012.

There were 16 entanglements in the last 2 years where the identification no. of the fishing gear could be determined. 13 of these were lobster gear, with 3 entanglements from octopus fishing. For the octopus entanglements, the fisher's area of operations was determined from logbook returns. For the lobster gear, catch disposal records were assessed for 30 days prior to the entanglement. In most cases, only one block was fished. Where more than one block was taken, a weighted mean position was established using the number of pots in the water at the block locations.

These locations of where pots were fished that resulted in entanglements spanned from just south of Fremantle to the Abrolhos Islands (Figure 4a). They however do not appear to be related to areas of high winter fishing 'effort', as expressed as pots in the water (Figure 4b).

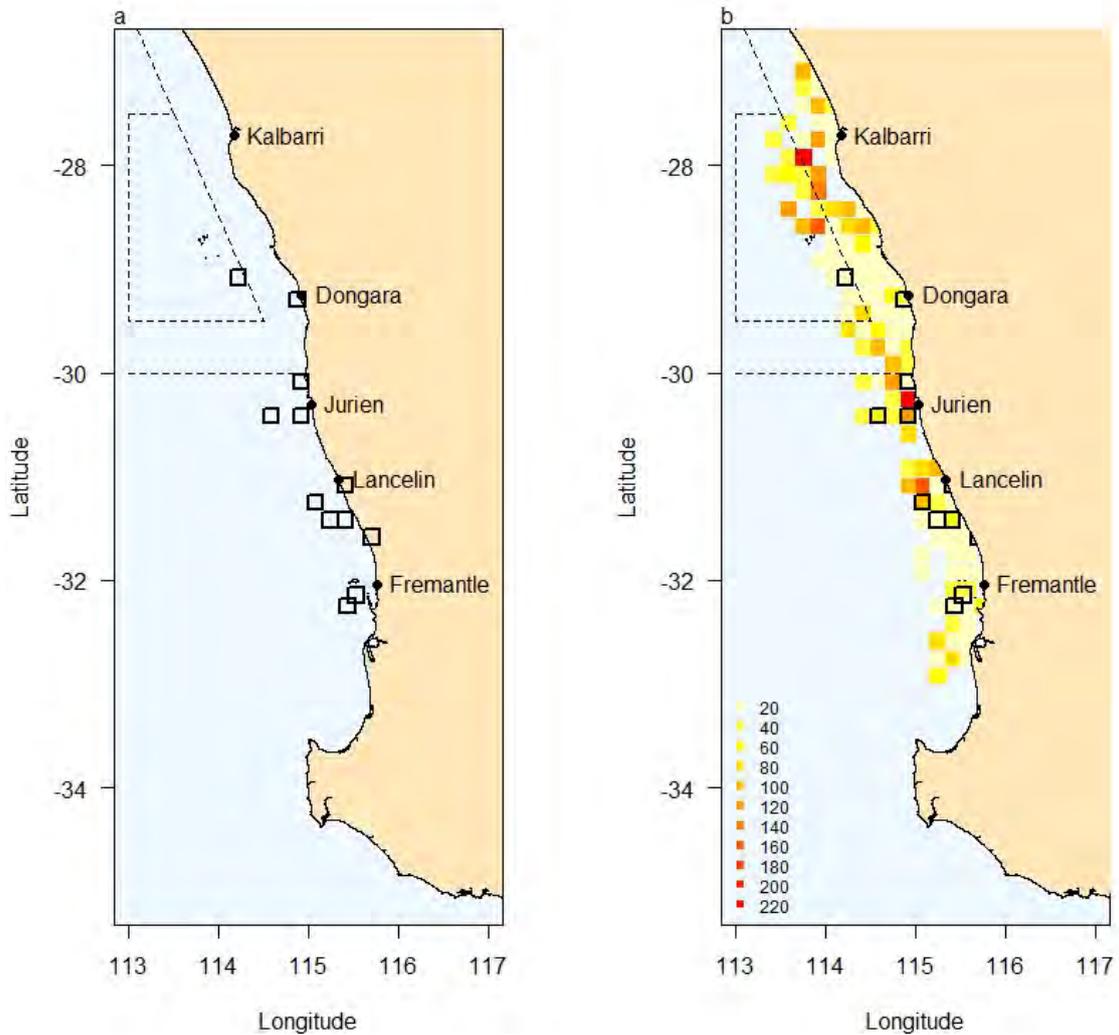


Figure 4 a) “Location” of whale entanglements where fisher identity could established b) “Location” of whale entanglements (as per part a) with number of winter pots in the water (pots x days in water during May-Oct) (x1000)

Entanglements with WRL gear occurred in all depths, though the majority (77%) were in 20 to 40 fathoms (Figure 5a). This is not reflective of the ‘effort’ that was fished in these depths over the last two winters, which shows most of the pots in the water were in the 10 to 30 fathoms, with little potting effort in the shallows (0-9 fathoms) or in the deep (30-39 fathoms). When entanglements in WRL gear are standardised for effort (pots in the water), there were clearly more entanglements in WRL gear set in water of 30 + fathoms (Figure 5b). This fits with the migration patterns of humpbacks along the west coast which appear to be further offshore on their northern migration. It may also reflect the nature of fishing in deeper water. Deeper set pots tend to have greater surface line and more floats to compensate for the greater drag on the gear from strong offshore currents.

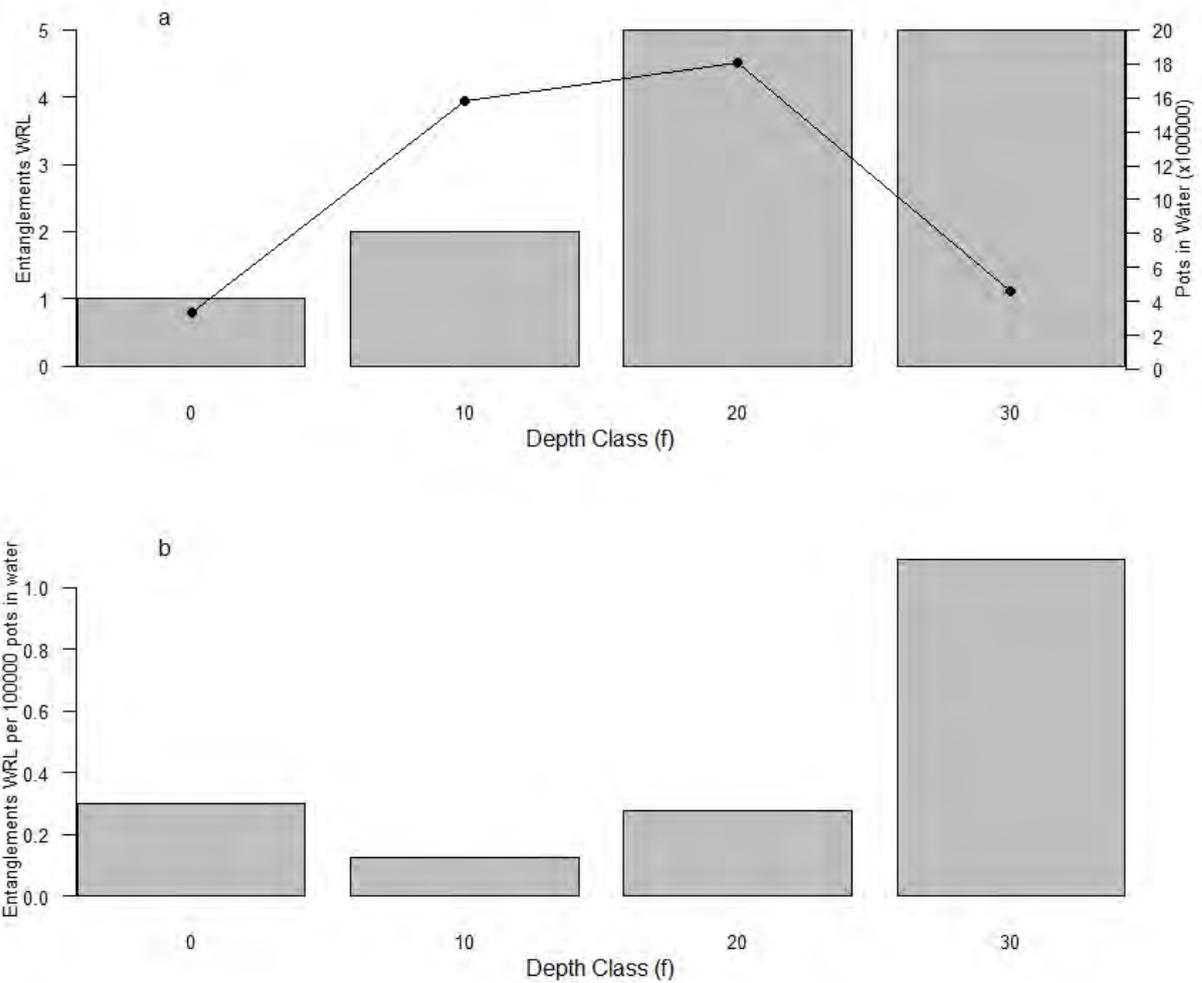


Figure 5 a) Number of whale entanglements in WRL gear for each of 10 fathom depth classes (grey bars) and the number of pots in the water during the 2011 and 2012 winter (May-Oct) (black dots and line) for the respective depth classes. b) Number of entanglements standardised per 100,000 WRL pots in the water in winter (as above).

Key Points

- There has been a dramatic increase in the number of whale entanglements associated with the northern migration of humpback whales in the last two years.
- This level of interaction is not meeting our KPI for whale entanglements.
- With the southern migration having now begun (the northern turn-around begins late August), further interactions may still occur this season.
- Without changes to fishing behaviour or gear, the numbers of interactions is likely to increase in following seasons due to both further whale population increases and season expansion.
- Most interactions occur with the float gear and ropes of the set pots.

- Interactions appear to occur at locations throughout the fishery.
- While interactions can occur in all depths, there are significantly more entanglements in deeper water (30+ fathoms) on per pots in the water basis
- Interactions with WRL gear begin mainly in June and extend for the remainder of the year when fishing occurs. There is an increased duration of interactions with increasing season length.
- The southern migration, which includes mothers with new born calves, tends to be closer to the coast and occurs later in the year (Oct-Nov). Fishing hasn't occurred in these months previously (1 Oct – 14 Nov). With this migration being more inshore, there is the potential for an increase in entanglements is enhanced if fishing continues during this time period.

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Attachment 5
ERA Workshop Record

Western Rock Lobster Fishery
Ecological Risk Assessment – February 2013

Western Rock Lobster Ecological Risk Assessment, referring to threats assessed in the 2007 ERA

ERA No	Threats	ERA Date	Cause	Effect	Intervention scenario	Existing risk management responses	Existing risk assessment (ERA)	Planned interventions (ERA)	Proposed remedial action for consideration	Consequences	Adapted DPMa methodology	Remarks
							Consequence Likelihood Risk rating				Consequence Likelihood Risk rating	
3	2007 Efficiency changes	2007	Increase in the size of fishing vessels, fish-finding technology and fishing patterns. Fishing of residual stocks offshore.	Higher catch efficiency, local depletion of target species and larger concentrations of the target species in the near-shore zone.	Reduction in towed gear effort and depletion rate on an annual basis, presented in management controls. Stock assessment review in 2007 (A Hill to 2007) and subsequent stock assessment in 2007 (interim report). Review of harvest strategy on breeding stock, effort and effort rate. Eighteen fishery effort pots removed in 1999/04 equivalent effort reduction in northern zone and five percent in southern area. Management strategy overrides the potential consequences of efficiency gains. Quota system implemented.	Deep water research vessel may reveal information on predatory relationships. Surrender zone study at L'Anse-au-Loup in June/July 2007 may reveal information on predator-prey relationships. June/July 2007 ecosystem study to model interactions of predators and sea urchins. Tropidomyrmex effects of fishing, particularly in the northern zone. Fishes versus unfished areas after the boat. Lobster abundance has not increased.	3 2 to 3 Low to medium	Planned interventions (ERA)	Contingency planning for consideration with effort reductions. Option expressed that no specific new management response is required as the current management is appropriate for mitigating the hazard, however the extent of this efficiency gain is the fishery.	3 2 Low		
21	2007 Central west coast - shallow	2007	Change to population size, structure and abundance	Resilience change to community structure and function (predator/prey relationships). Possible loss of ecosystem resilience.	Use of large animals from the shallow water environment leads to long term ecological consequences.	Deep water research vessel may reveal information on predatory relationships. Surrender zone study at L'Anse-au-Loup in June/July 2007 may reveal information on predator-prey relationships. June/July 2007 ecosystem study to model interactions of predators and sea urchins. Tropidomyrmex effects of fishing, particularly in the northern zone. Fishes versus unfished areas after the boat. Lobster abundance has not increased.	3 2 Low					Shallow water 20-40% of fishery depending on location. Underline in shallow water complex, a large proportion of the population of lobsters in shallow water. Rock lobster population species in community, can have local depletion. Impact of removal of lobsters from shallow water likely to be small as approximately equal size move offshore as in the migration of the population. Research in more representative areas of the fishery. Research in the 1980s at Bonanza indicated they have an effect on benthic communities. Does not seem to be severe impact of removing lobsters by fishing. Three years of study has not revealed any obvious change in community structure relating to lobster fishing. The proportion of legal size rock lobster in shallow water is <10% of total shallow water rock lobster biomass. Risk analysis is based on preliminary findings of the research over the first three years.
22	2007 Central west coast - deep	2007	Change to population size, structure and abundance	Resilience change to community structure and function (predator/prey relationships). Possible loss of ecosystem resilience.	Use of large animals from the shallow water environment leads to long term ecological consequences.	Deep water research vessel may reveal information on predatory relationships. Surrender zone study at L'Anse-au-Loup in June/July 2007 may reveal information on predator-prey relationships. June/July 2007 ecosystem study to model interactions of predators and sea urchins. Tropidomyrmex effects of fishing, particularly in the northern zone. Fishes versus unfished areas after the boat. Lobster abundance has not increased.	2 1 Negligible					Species changes to this management structure has seen an improvement in standing stocks both in shallow and deep. Move so far as to indicate in shallow water complex a large proportion of the total population of lobsters in shallow water. Continue local migration of the whites. Does not seem to be severe impact of removing lobsters by fishing. Eight years of study has not revealed any obvious change in community structure relating to lobster fishing. The proportion of legal size rock lobster in shallow water is <10% of total shallow water rock lobster biomass. Risk analysis is based on findings of the research over the first eight years. Research has been unable to detect change less than 25%.
23	2007 Central west coast - deep	2007	Capture the unknown trophic relationships with whites.	Changes to species relative abundance in the region.	No change from the genes expressed in the 2007 ERA.	FRDC project to investigate deep water ecology. Effort levels are much lower (70 percent less). Research has not identified a way to measure potential ecological effects because so far the positive indicators have been too great.	2 3 Low	Planned interventions (ERA)	Planned workshop in August with international experts and the rock lobster ESC-516 to review ongoing project proposal including the possible use of fished and unfished areas. WA Marine Science Institution (WAMSI) projects. Research to begin identifying management decisions beginning about 2008 (as expressed in MSC timetable).	2 3 Low	Paucity of data from deep water and proportion of legal size/age lobsters in deep water has been made a research priority by the Scientific Reference Group. Comparison of fishing intensity (looking for a low to high abundance gradient) to detect changes in standing stocks, effort and effort rate on catchability, length/weight behaviour, etc. Subject of three year FRDC project (ongoing).	
24	2013 Central west coast - deep	2013	Depletion of biomass has unknown trophic and/or ecosystem impacts.	Changes to species relative abundance in the region.	No change from the genes expressed in the 2007 ERA.	Continuing research (FRDC project) to investigate deep water ecology. FRDC project for spatially accurate habitat mapping and baseline information to monitor in repeat (L'Anse-au-Loup) surveys of fished (June) and unfished (L'Anse-au-Loup) areas (July year project). Camera on post being deployed at L'Anse-au-Loup (BSS plan).	2 2 Low		Subject of eight year FRDC project (ongoing). Significant management changes to reduce capture.	2 2 Low		

Western Rock Lobster Fishery
Ecological Risk Assessment – February 2013

ERA No.	Threats	ERA Date	Cause	Effect	Intervention scenario	Existing risk management responses	Existing risk management response	Consequence	Likelihood	Risk ranking	Planned interventions to meet the action plan to be implemented	Suggested remedial action for consideration	Consequence	Likelihood	Risk ranking	Remarks
7	Octopus	2007 2013 (no change)	Reduction of octopus by fish to processors with increasing marketability.	Depletion of octopus stocks (short lifespan and highly variable recruitment). Trends indicate most commonly captured individuals are 100% adult (3-5 cm per pair 10 pair life).	Reduction of octopus impact on sustainability of octopus population.	Investigation reports from fishery. Code of practice for DVD - how to reduce marine interactions.	1	3	Low			Blank reporting. Follow up logbooks.				Distribution very similar to lobster fishery. Octopus catch rates have increased slightly since the 1990s. Octopus is major prey of sealions.
14	Bob tailfish	2007 2013 (no change)	Collision of entrapment gear with fishing vessels or entrapment in pot lines.	Mortality of individuals (1-2 annually reported).			1	3	Low							A study to understand whether the fishery is having impact on stock is worthy of investigation.
23	Kalbarri - Big Bank	2007	Capture has some impact on the ecosystem of the region.	Depletion of species abundance in the region.	The shallow water hazard cannot be distinguished from the Central West Coast shallow and deep water Hazard Nos. 21 and 22.	Special management area, to prevent conflict among fishing vessels (congestion).	2 (shallow) 2 (deep: Big Bank, along as area is closed)	2 1 (deep: Big Bank, along as area is closed)	Low (shallow) Negligible (deep: Big Bank)		Planned workshop in August 2007 with international experts and the rock lobster Eco ERG to review deepwater research projects, and to develop an action plan for the use of lined and unfished areas. WA Marine Science Institution (WAMSI) projects. Research to begin informing management decisions around 2008 (as expressed in MSC model).	Refer to remarks for 2005 ERA Hazard Nos. 21 and 22 above.				
32	Ball bearings, dusky whalers	2013 2007	Depletion of ball bearings from ecosystem impacts. Discarding of ball bearings by fishermen. Dusky whalers distribution in the southwest for much further north to Ningaloo. Adult migration thought to be on the shelf. Anecdotal reports of ball bearings in fishing vessels.	Depletion of species abundance in the region but effect on long-term fishery.	Ball bearings (persistent) are the major mortality to adult Dusky whalers. The number of ball bearings in the region are unknown.	Ball Handling Code of Conduct -- disposal of bait and rubbish.	3 (shallow) 3 (deep: Big Bank, along as area is closed)	3	Low (shallow) Negligible (deep: Big Bank)		Research to begin informing management decisions around 2008 (as expressed in MSC model).	Zero tolerance of ball bearings by the rock lobster fishery.	(none)	(no interaction)	Medium	No fishing pressure in Big Bank (closed indefinitely since 2005). Big Bank is treated as the deep water area. Kalbarri is considered to be the remainder of Zone B. Significant depletion occurred prior to closure of deep water areas. Age of Dusky whaler maturity is older than previously thought (~30 yrs instead of ~20 years). Reporting is not systematic, but no mortalities reported last couple of years. WAFIC Board will proceed with initiative to prohibit ball bearings with the Minister. Problems for fishermen in Arothos Islands. Ball bearings are observed in the Arothos with entanglement of pinnipeds. Observed injury/fishery impacts/fisheries. Adult mortality is estimated at about 100 individuals per year (introduced size limits have probably reduced mortality by half. Loss of adults as a result of rock lobster ball bearings is not known. Critical component of the stock is the adult population. Sharks and rays are protected with respect to commercial fishing only (since June 2008). View expressed that exploitation of the fishery is not consistent with the scientific view that the population is at risk of collapse as a result of adult mortalities.
		2013	Ball bearings being used on fishing vessels and other fishermen.	Ball bearings being used on fishing vessels and other fishermen.	Ball Handling Code of Conduct -- disposal of bait and rubbish. Prohibition of ball bearings on fishing vessels in 2011. Fishery officers are monitoring compliance. Good uptake with fishers.		1	1	Negligible							Three virtually eliminated through the prohibition of ball bearings in 2011.

Western Rock Lobster Fishery
Ecological Risk Assessment – February 2013

IRA Ref No.	Threats (to the IRA)	IRA Date	Cause	Effect	Recovery scenario	Ecological management responses	Existing risk - Accepted DFWA management	Planned management responses (to be implemented)	Supporting actions for cost reduction	Consequences	Accepted DFWA management	Risk ranking	Remarks
19	Benthic ecosystem	2007	Removal of lobsters from the region. Only a small proportion of lobsters are only during a short period (3.5 months).	Depletion of species abundance in the region.	Considered to be similar shallow to West Coast shallow.		3			2	Low	Greater abundance of intermediate sponges compared to nearshore coastal. Biomass removal is therefore significantly lower than maintained coast. Females mature at smaller size. Considered removal of illegal size lobsters. Three and a half month fishing season. Coral community, shallow water.	
20	Leewards - Naturalists	2007	Depletion of biomass and unknown trophic and/or ecosystem impacts.	Loss of large animals from the shallow water environment leads to potential ecological consequences.	Move to quota management has reduced fishing pressure in the region and reduced effort elsewhere. Exploitation is not concentrated on particular areas.		2			2	Low	The proportion of illegal size rock lobster in shallow water is <10% of total shallow water rock lobster biomass. Quota management and year-round fishing.	
20	Leewards - Naturalists	2007	Aspects in recruitment.	Fluctuation in abundance as observed in this region, leading to higher level of fishing effort when this occurs.	Disproportionate impact on the environment. Removal of spawning stock, not re-vegetation.		1			2	Negligible	Large increase of fishing vessels in the region prompted a question about the potential impacts to the community structure/function. Area exhibits historically low recruitment. Risk is related to how the fishery is managed (200-250 boats in the southern region), with respect to settlement and recruitment. Social interactions (and conflict) were significant with other users of the marine environment. There is no unique habitat associated with the Leewards/Naturalists region that should be considered here.	
20	Leewards - Naturalists	2013					1			1	Negligible	Risk is related to how the fishery is managed (200-250 boats in the southern region), with respect to settlement and recruitment (and conflict) with other users of the marine environment. In 2013, there are only 140 boats left in the C Zone.	
4	Mortality and loss of productivity from handling.	2007, 2013 (no change)	Irregular handling of lobsters. Potential damage during high grading. Larger females, setose and repeatedly caught and handled.	Appreciable loss. Deposition of animals during discarding.	Reduced productivity and increased mortality. Reduced egg production. (10% in deep water, more frequent in shallow water???)	Two year education study in 1980s. Requirement to return setose animals increases handling. Storage gaps in pots to avoid redressing lobsters. Pot lifts have extended - 10 year in 10 years.	1		Increase gap size on pots to reduce capture of undersize animals. Recurrence education programs for handling. Enforcement of the five minute rule.	5	Low	Fishers have recognized value of washing down decks and gear to reduce salt build-up, which tends to cause lobsters to shed legs.	
25	Benthic beds - shallow water, inshore	2007	Pot sets and lifts. Anchoring of boats.	Mechanical damage to benthic habitat.	Shallow water interaction of pots with benthic habitat.		1			3	Low	Pot footprint (set) is very small when compared to areal extent of habitat types.	
2013							1			3	Low	Increasing efficiency is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.	
25	Benthic beds - shallow water, coral	2007	Pot sets and lifts. Anchoring of boats.	Mechanical damage to benthic habitat.	Shallow water interaction of pots with benthic habitat. Coral (not restricted to C Zone).	Move to quota management has reduced fishing pressure in the region and reduced effort elsewhere. Exploitation is not concentrated on particular areas.	1			3	Low	Necessity of lobster assessed that conversion of benthic habitat damage from storm damage appears to be very significant when compared to the mechanical damage of pot sets and lifts.	
2013							1			2	Negligible	Increasing efficiency is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.	
25	Benthic beds - shallow water, Sargassae	2007	Pot sets and lifts. Anchoring of boats.	Mechanical damage to benthic habitat. Sargassae interaction is frequent.	Shallow water interaction of pots with benthic habitat. Coral (not restricted to C Zone). Sargassae	Repeat surveys of shallow water corals at the Acrotion Islands is not detecting any significant bias.	1			2	Negligible	12 month season has decreased fishing effort in shallow water coral areas. Fishers avoid coral habitats when setting pots due to damage to gear.	
2013							1			2	Negligible	Increasing efficiency is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.	
25	Benthic beds - shallow water, limestone	2007	Pot sets and lifts. Anchoring of boats.	Mechanical damage to benthic habitat.	Deep water interaction of pots with benthic habitat. Limestone	Repeat surveys of shallow water corals at the Acrotion Islands is not detecting any significant bias.	2			3	Low	Deep water corals are less abundant and are possibly more vulnerable to loss (more fragile, longer recovery). However, there is no evidence to suggest any significant change from pot interaction.	
2013							1			3	Low	Increasing efficiency is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.	
25	Benthic beds - deep water, coral	2007	Pot sets and lifts. Anchoring of boats.	Mechanical damage to benthic habitat.	Deep water interaction of pots with benthic habitat. Coral (not restricted to C Zone).	Repeat surveys of shallow water corals at the Acrotion Islands is not detecting any significant bias.	2			3	Low	Increasing efficiency is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.	
2013							2			3	Low	Deep water corals are less abundant and are possibly more vulnerable to loss (more fragile, longer recovery). However, there is no evidence to suggest any significant change from pot interaction.	

Western Rock Lobster Fishery
Ecological Risk Assessment – February 2013

Western Rock Lobster Ecological Risk Assessment, referring to threats assessed in the 2007 ERA

ERA No.	Threats	Risk Date	Cause	Effect	Interaction scenario	Existing risk management responses	Emerging risk - Adjusted DPM as a proxy	Planned or committed actions for overall actions (add to the implementation)	Significance of potential action for consideration	Trend of risk - Adjusted DPM as a proxy	Risk ranking	Remedial
							Consequence	Consequence	Consequence	Consequence	Consequence	Consequence
23	Benthic beds – deep water, seagrass	2007	Disturbance and siltation. Anchoring of boats.	Mechanical damage to benthic habitat. Seagrass retention is infrequent.	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	Deep water abrasion of jobs with benthic habitat. Seagrass (not restricted to C Zones). Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	2	2	Low			Seagrass retention is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.
25	Benthic beds – deep water, soft sediments	2013	Pot sets and lift. Anchoring of boats.	Mechanical damage to benthic habitat (fauna).	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	2	2	Negligible			Seagrass retention is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.
25	Benthic beds – deep water, hard bottom	2007	Pot sets and lift. Anchoring of boats.	Mechanical damage to benthic habitat (fish feeding organisms).	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	2	2	Negligible			Seagrass retention is being observed by fishers with much lower quota. Result is lower frequency of pot interactions with habitat.
10	Whales (ecological)	2007	Entanglement in gear. An important contributing factor is excessive rope. Migration of whales into the sea where whales are present.	46 incidents of capture since 1992 for all fisheries (7 out of 9 by lobster fishers in 2006, one mortality source unknown). Migration of whales into the sea where whales are present. Effect of mortality was different impact on different species. Small effective population size. Southern Right Whales (SRW) are more vulnerable.	Recent data (since 2007) on entanglements suggesting increased frequency. Public perception.	Recent data (since 2007) on entanglements suggesting increased frequency. Public perception.	Minor (SRW) (Humpback)	Minor (SRW) (Humpback)	Low (SRW) (Humpback)			Southern Right Whale has minimal spatial overlap with the fishery.
	Whales (ecological)	2013	Public perception.	Recent data (since 2007) on entanglements suggesting increased frequency. Public perception of threat resulting in concern.	Impact on public perception of whale stock. Observed mortality as a threat to whales. Frequent public awareness of entanglements resulting in mortality.	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	1	1	Low (SRW) (Humpback)			Move in fishing effort through June-September. Southern migration closer to shore, with little interaction with southern migration to date. Industry workshop in February 2013 to explore mitigation strategies. Code of practice introduced in 2006. Longer soak times are occurring in recent times. The loss of 4 animals in 20 years, out of a population size of 30,000 does not represent a threat to population size or recovery. The social consequences of entanglement depend on media coverage and the possibility of sharks presenting a threat to the public close to shore. In the last two years there has been a numerical increase in entanglement frequency, however its long term trend cannot be determined. Root cause of increased whale entanglements is not clear. The question of legislation around export permits is not in the scope of this assessment. There is no guidance for what constitutes acceptable risk. Advice of Ocean and Coasts (OC) is to continue reporting with the respect of safety disentanglement. Setting a higher level to stop fishing is not recommended. There is not enough data to predict future incidence of entanglements with respect to the continuous fishing season.
	Whales (public concern for comparison)	2013	Public perception.	Recent data (since 2007) on entanglements suggesting increased frequency. Public perception of threat resulting in concern.	Impact on public perception of whale stock. Observed mortality as a threat to whales. Frequent public awareness of entanglements resulting in mortality.	Deep water abrasion of jobs with benthic habitat. Seagrass retention is infrequent.	1	1	Low (SRW) (Humpback)			Southern Right Whale has minimal spatial overlap with the fishery. Move in fishing effort through June-September. Southern migration closer to shore, with little interaction with southern migration to date. Industry workshop in February 2013 to explore mitigation strategies. Code of practice introduced in 2006. Longer soak times are occurring in recent times. The loss of 4 animals in 20 years, out of a population size of 30,000 does not represent a threat to population size or recovery. The social consequences of entanglement depend on media coverage and the possibility of sharks presenting a threat to the public close to shore. In the last two years there has been a numerical increase in entanglement frequency, however its long term trend cannot be determined. Root cause of increased whale entanglements is not clear. The question of legislation around export permits is not in the scope of this assessment. There is no guidance for what constitutes acceptable risk. Advice of Ocean and Coasts (OC) is to continue reporting with the respect of safety disentanglement. Setting a higher level to stop fishing is not recommended. There is not enough data to predict future incidence of entanglements with respect to the continuous fishing season.
30	Marine reserves - water quality	2007	Potential for human activities to cause an elevated level of nutrients discharged to the sea.	Impact on marine biodiversity at the Abolhos Islands. Damage to coral from pots and vessel activities.	Increased nutrient loading from surrounding waters. Water sampling program for nutrients and bacteria. Requiring household and fishing activity waste to be managed instead of incineration for non-potable waste (such as paint, plastic, metal or oil filters etc).	Increased nutrient loading from surrounding waters. Water sampling program for nutrients and bacteria. Requiring household and fishing activity waste to be managed instead of incineration for non-potable waste (such as paint, plastic, metal or oil filters etc).	1	2	Negligible			Background sources of nutrients are seagrass, plant decay on beaches. Waste Management Plan includes three year sampling program. Maceration of food scraps prior to discharge and disposal at night to avoid attracting seabirds.
	Marine reserves - water quality	2013	Increased nutrient loading from surrounding waters.	Impact on marine biodiversity at the Abolhos Islands. Damage to coral from pots and vessel activities.	Increased nutrient loading from surrounding waters. Water sampling program for nutrients and bacteria. Requiring household and fishing activity waste to be managed instead of incineration for non-potable waste (such as paint, plastic, metal or oil filters etc).	Increased nutrient loading from surrounding waters. Water sampling program for nutrients and bacteria. Requiring household and fishing activity waste to be managed instead of incineration for non-potable waste (such as paint, plastic, metal or oil filters etc).	1	2	Negligible			Background sources of nutrients are seagrass, plant decay on beaches. Waste Management Plan includes three year sampling program. Maceration of food scraps prior to discharge and disposal at night to avoid attracting seabirds.

