

PIRSA

Ecologically Sustainable Development (ESD) Risk Assessment of the South Australian Southern Rock Lobster Fishery. Edition 2.

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1 Introduction

Ecologically Sustainable Development (ESD) principles are the basis of fisheries and aquatic resource management in South Australia. ESD in the Act is described as — *“the use, conservation, development and enhancement of the aquatic resources of the State in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being”*. To efficiently meet its ESD accountabilities, PIRSA Fisheries has adopted the National ESD Reporting Framework for Fisheries (Fletcher et al. 2002).

Management plans for the South Australian Commercial Southern Zone Rock Lobster Fishery (SZRLF) and Northern Zone Rock Lobster Fishery (NZRLF) were adopted in 2013 and 2014 respectively, each for a period of five years (PIRSA 2013a, 2014). A review of these management plans was undertaken in 2017-18 and 2018-19, overseen by the Rock Lobster Fishery Management Advisory Committee.

An ESD risk assessment for the South Australian commercial Rock Lobster Fishery was carried out in 2011 (PIRSA 2013b) to inform development of the 2013 and 2014 management plans.

A review of the ESD risk assessment is considered an important step in reviewing the management plans to objectively assess if risk rankings have changed over the duration of the management plan. A revised risk assessment will also provide important information for development of a revised management plan if one is required.

This report provides the outcomes of the review undertaken by PIRSA in 2018 of the 2011 ESD risk assessment.

2 Background

Rock Lobster have been harvested in South Australian waters since the 1890s, but the commercial fishery did not develop until the late 1940s-early 1950s. Since then, a series of management arrangements have been introduced to control the catch of Rock Lobster in South Australia, including closed seasons, pot and boat limits, as well as output controls including size limits and quota management. For information on the background of the fishery including management arrangements and objectives, please refer to the Southern and Northern Zone Rock Lobster Fishery Management Plans (PIRSA, in draft).

A range of input and output management arrangements are in place for the fishery, however a catch quota management system including individual transferable quota units is the key management arrangements to ensure

sustainable harvest of the resource. Quota management was introduced into the SZRLF in 1993, and in the NZRLF in 2003.

Harvest strategies were developed for both fishing zones to guide the setting of annual total allowable commercial catch (TACC) in 2011. The harvest strategies were incorporated in management plans adopted in 2013 and 2014. These harvest strategies were reviewed in 2014/15 and revised harvest strategies adopted in 2015¹.

Stock status of the South Australian Rock Lobster Fishery is monitored and assessed regularly with publication of the outcomes reported in annual stock assessment reports. The most recent stock assessment reports available at the time of developing this ESD Risk Assessment assessed the stock in 2015/16 (Linnane et al. 2017a, b).

The South Australian Rock Lobster Advisory Council (SARLAC) commissioned Dr Tony Smith to conduct a review of the stock assessment and monitoring program for the South Australian Rock Lobster Fishery to identify and review opportunities to improve, strengthen and innovate the stock assessment and monitoring program. This review identified a productivity shift in the fishery acknowledging that the reason for the shift was not clear (Smith, unpublished).

Licences in the SZRLF and NZRLF can also commercially fish for marine scalefish fish dependant on the level of access the licence holders have chosen. This ESD risk assessment only considered the risks related to targeted fishing for Southern Rock Lobster with rock lobster pots as risks for marine scalefish fishing by licence holders is considered in the risk assessment for the Marine Scalefish Fishery.

3 Methods

The scope of this ESD Risk Assessment includes:

1. Targeted fishing for rock lobster (*Jasus edwardsii*) in the South Australian Commercial Rock Lobster Fishery
2. Fishing activity related to the use of rock lobster pots. Fishing activity with any other authorised gear types
3. Assessment of potential impacts on the fishery in the next five years

¹ Harvest strategies for the NZRLF and SZRLF are available at http://www.pir.sa.gov.au/fishing/commercial_fishing/fisheries/rock_lobster_fishery

The process for the review of the current risk assessment was:

1. Collated new documented information related to all risks components included in the 2011 risk assessment report that had become available since the last risk assessment.
2. Conducted workshop/s of stakeholders² on 19 June and 23 July 2018 to:
 - a) Identify risk components that were relevant to the new information and determine if the new information would significantly change the risk ranking.
 - b) Complete risk assessments of the identified risk components based on the likelihood and consequence of events described in PIRSA (2013) using consequence and likelihood matrix provided at Appendix 10.
 - c) For those risks for which no new information is available, or the available information was not significant, the risk rating from the 2011 risk assessment was adopted.
3. Risks were prioritised according to their severity detailing the information considered and the reasons (information used, or adoption of previous risk rating) in assigning risk.
4. For higher level risks a full ESD performance report in the context of specific management objectives was prepared. This includes operational objectives, indicators, data required and performance measures.
5. This detailed fishery-specific background report was also prepared.

Further detail of the general ESD Risk Assessment methodology can be found in the 2011 risk assessment for the fishery (PIRSA 2013b).

² A list of participants at the workshop/s are provided at Appendix 2

4 Performance reports

4.1 Retained Species

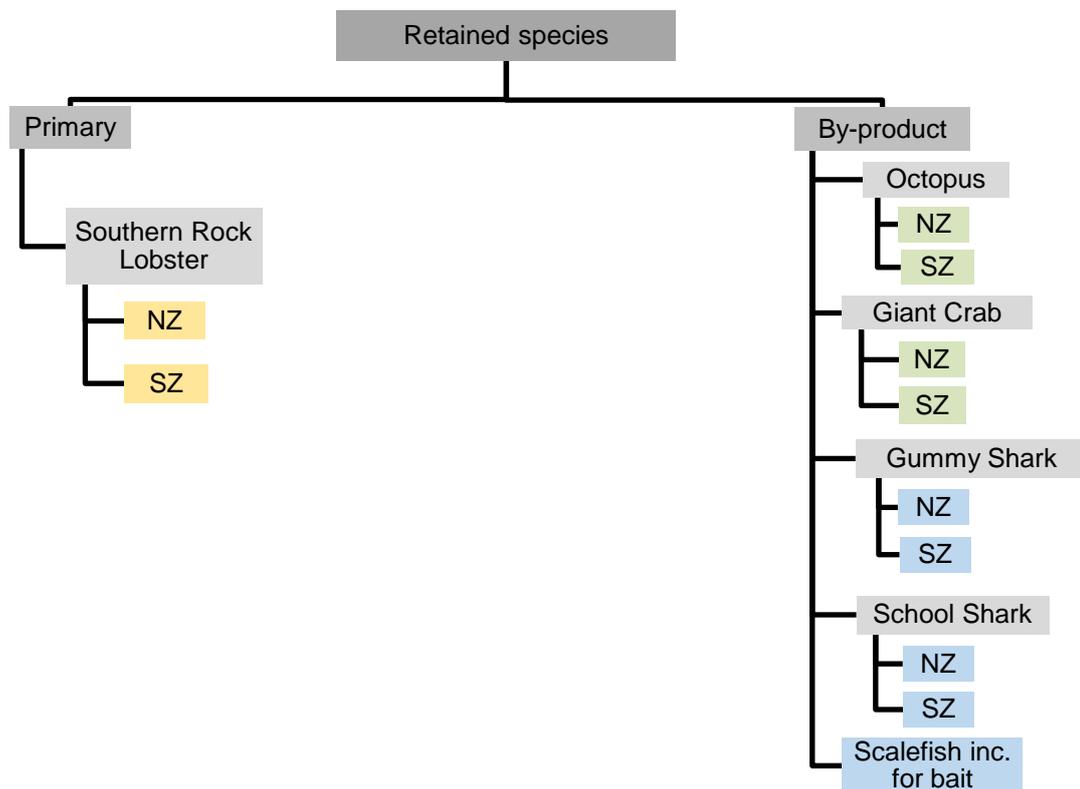


Figure 1. Component Tree for Retained Species

Broad Objective: Harvest of retained species is within ecologically sustainable limits

Matrix used: Table 4 and Table 6

It was clarified that this assessment only considered the impacts on target and by-product species captured in the rock lobster pots. All other by-product or by-catch species caught on other gear such as Marine Scalefish Fishery gear is not included in this assessment.

It was considered appropriate to assess the main target and by-catch species in each zone due to the differences in operation and geography of the Northern Zone (NZ) and Southern Zone (SZ).

Primary Target Species – Southern Rock Lobster

The following new information was considered at the meeting

- Stock status and performance indicator (Linnane et al., 2017a,b,c,d)
- review of the stock assessment and monitoring program by Dr Tony Smith (Smith, unpublished).

DRAFT

- Introduction of winter fishing and spatial TACCs for NZ in 2015 and 2016³
- Harvest strategies for the NZ and SZ adopted in 2015^{Error! Bookmark not defined.}
- Electronic monitoring was introduced for the SZ (2017) and was being trialled in the NZ (2017) with the expectation that this would also be in place for the NZ from the 2019 fishing season
- New information on stock status is available for Southern Rock Lobster was considered as included in Linnane et al. (2017a,b,c,d) including stock status classified as “sustainable” (SZ) and “transitional depleting” (NZ). It was noted that the current harvest strategies provided for appropriate response to changes in stock status including decreasing TACC as stock abundance (as proxy for stock status) decreased.
- It was also noted that information provided in a (unpublished) review of the stock assessment and monitoring program by Dr Tony Smith. This review identified a productivity shift, particularly for the NZ but also for the SZ, however the cause of this productivity shift was not identified. Recommendations in this report are being considered in development of new harvest strategies for the fisheries.

NZRLF

Moderate (C2), Likely (L4). Risk Medium.

- While it was acknowledged the current level of exploitation is low in a historical context, catch rate as the primary performance indicator had declined over the last five fishing seasons, however, catch rate is above the reference point detailed in the harvest strategy at which the fishery would be closed (considered as a limit reference point).
- It was noted that pre-recruit index had shown signs of improvement in recent seasons.
- The possible impact of a shift of fishing effort from summer to winter fishing on the fishery was noted. In particular, in winter months there were reduced numbers of female lobster caught, and therefore increased winter fishing catch may lead to reduce levels of the take of females, thus increase egg production over the whole season. This was considered to be of potential benefit to the stock.

SZRLF

Moderate (C2), Likely (L4). Risk Medium.

³ See

http://www.pir.sa.gov.au/__data/assets/pdf_file/0006/276414/Notice_to_fishers_NZRLF_re_winter_fishing_May_2016.pdf for further information regarding winter fishing in the NZRLF

http://www.pir.sa.gov.au/__data/assets/pdf_file/0008/264239/Notice_to_fishers_NZRLF_15_16_TACC.pdf for further information regarding introduction of regional quota in the NZRLF

- The SZ management unit is currently classified as Sustainable. The SZRLF was considered to be fully exploited, but long term recruitment/dynamics were not adversely impacted.
- It was considered that consequence was acceptable noting that fishing impacts were detectable against background.
- It was considered that the current levels of exploitation was low compared to historical rates and that the catch rate was above the reference point detailed in the harvest strategy at which the fishery would be closed (considered as a limit reference point).
- It was considered that the fishery was operating at acceptable levels, however the consequence was higher than minor.

By-product

Giant Crab

SZ - Minor (C1), Likely (L4). Risk Low.

NZ - Minor (C1), Possible (L3). Risk Low.

- The workshop considered new information available for Giant Crab including outcomes of a review of performance indicators for the fishery included in (McLeay 2018) and the ESD risk assessment for that fishery (PIRSA 2018).
- It was noted that Giant Crab status is monitored through the dedicated Giant Crab Fishery monitoring program and the current status of the South Australian stock is “sustainable”.
- It was noted that fishers targeting rock lobster are generally fishing in shallower water than that favoured by dedicated Giant Crab fishers thus the potential for by-catch of Giant Crab during Rock Lobster fishing activities was reduced. This was supported by the general reduction in catch and effort of Giant Crab as by-catch by rock lobster fishers since around 2009 (McLeay 2016).
- It was also noted that in the NZ the requirement to have seal spikes in pots in water less than 100 m was likely to restrict entry of Giant Crab into the pots.
- The likelihood of impact to Giant Crabs in the Northern Zone where pot spikes were used lower was likely to be lower than the SZ.

Octopus

SZ - Moderate (C2), Unlikely (L2). Risk Low.

NZ - Minor (C1), Likely (L4). Risk Low

- The workshop considered the catch rates provided in the Rock Lobster stock assessment reports (Linnane et al. (2017a, 2017b) and total catch of octopus provided in the Marine Scalefish report (Steer et al. 2018).
- It was noted that there were a number of octopus species present in South Australia and there was some uncertainty on the main species that made up the octopus catch in the Rock Lobster Fishery.

- It was noted the stock status for octopus in South Australia in the National Status of Australian Fish Stocks report was “negligible” (Stewardson et al. 2016).
- The total catch of octopus in South Australia including from the Marine Scalefish Fishery and the Rock Lobster Fishery was monitored and reported to be <10t annually (Steer et al. 2018).
- Catch rates of octopus in both zones were variable, most likely reflecting the opportunistic life historic characteristics of cephalopods, that is stock naturally tend to boom and bust resulting in high and low levels of catch rates by the Rock Lobster Fishery.
- Fishers actively avoid areas of high octopus catch as octopus predate on lobster reducing profitability.

Southern Zone

- The catch rate of octopus in SZ in 2015/16 was not significantly different to levels considered in the 2011 risk assessment.
- Preliminary information from the 2016/17 fishing season indicated increased abundance of octopus demonstrated through higher catch rates.
- It was considered that the highest impact of the SZRLF on octopus was considered to be at acceptable levels - Moderate (C2).
- Some workshop participants considered that the consequence of the SZ fishery was not detectable or minimal (consequence level – Minor (C1)), however it was agreed that the highest considered consequence would be used to determine the risk rating.

Northern Zone

- It is considered that escape gaps required in NZ rock lobster pots from 2000 allowed for octopus to escape pots rather than being harvested thus reducing the potential impact of the fishery on this species.

Gummy Shark

SZ & NZ – Minor (C1), Remote (L1). Risk Negligible

- Management arrangements (pot spikes) in place in the NZ was considered relevant to capture of sharks as by-catch in rock lobster pots and thus the risk to gummy sharks in each zone was assessed separately.
- The workshop considered total catch of gummy shark provided in Steer et al. (2018) indicates the state-wide status for this species is “Sustainable”. A small proportion of the total catch (~6%) was reported to be harvested by Rock Lobster Fishery.
- Fishers noted that a very small proportion of gummy shark reported as caught by the Rock Lobster Fishery in Steer et al. (2013) would have been caught in

rock lobster pots, particularly in the NZ where pot spikes would deter entry of sharks into rock lobster pots.

School sharks

SZ & NZ – Minor (C1), Remote (L1). Risk Negligible

- The status of the Southern Australian biological stock of school sharks nationally is categorised as “overfished” in the National Status of Australian Fish Stocks report (Stewardson et al. 2016).
- Management arrangements (pot spikes) relevant to capture of sharks as by-catch in rock lobster pots are in place resulted in the risk to school sharks in each zone being assessed separately
- The total catch of school shark in South Australia is low compared to historical levels and less than the catch of gummy shark.
- A small proportion of the total catch of school shark (~6%) was reported to be harvested by Rock Lobster fishers. The majority of catch would have been taken on Marine Scalefish Fishery (MSF) gear and therefore not considered in this assessment, particularly in the NZ where pot spikes would deter entry of sharks into rock lobster pots (Steer et al. 2018).

Other Scalefish

SZ & NZ – Minor (C1), Remote (L1). Risk Negligible

- Scalefish in this assessment included other species of fish including molluscs, finfish etc. taken incidentally in rock lobster pots that may be retained, for example for use as bait.
- Some of the key species that would be included in this component are monitored through assessment of the Marine Scalefish Fishery. For example, leatherjackets and ocean jackets (two of the main scalefish species taken as by-catch in rock lobster pots (Brock et al. 2007) are classified as “sustainable” in Steer et al. (2018).
- The retained species component did not include assessment of snapper as under current management arrangements snapper taken in rock lobster pots are not able to be retained. Rather this species is considered under the non-retained species component tree.

4.2 Non-Retained Species

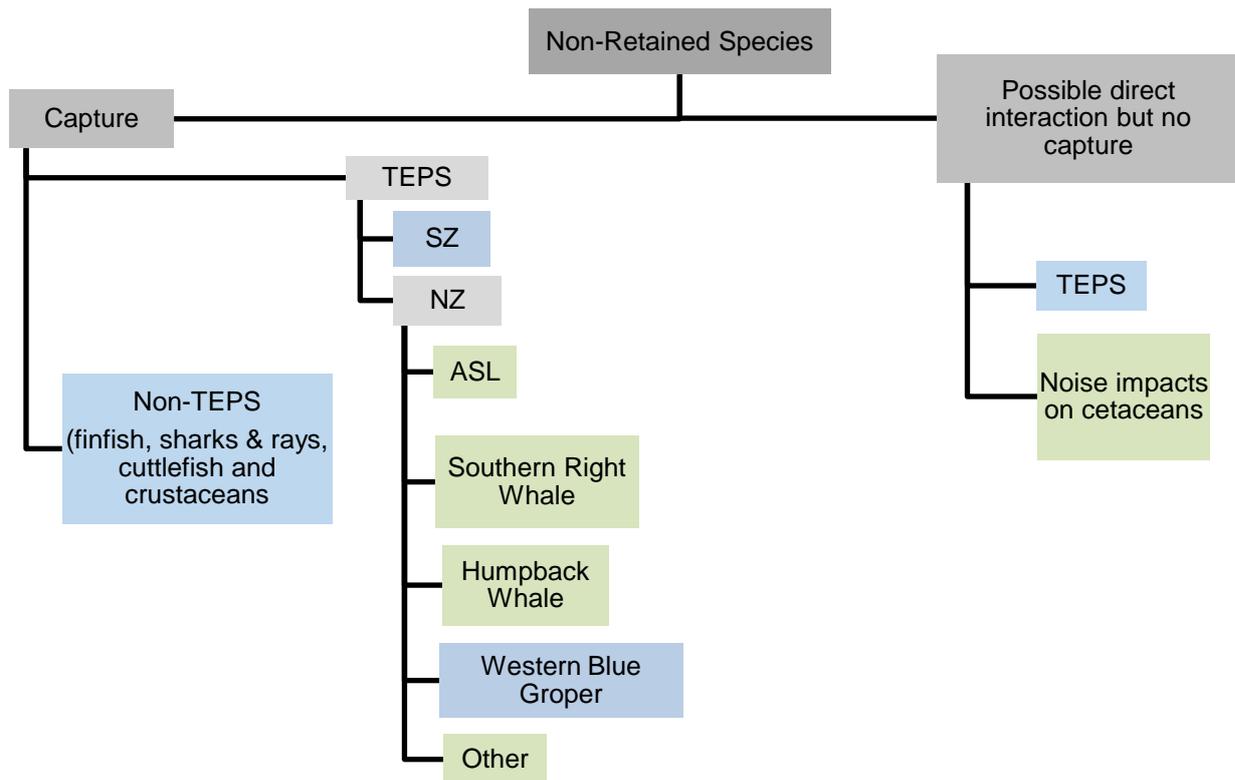


Figure 2. Component Tree for Non-Retained Species

Broad Objective: Minimise fishery by-catch and interactions with threatened, endangered and protected species (TEPS)

Assessment matrix used: Table 4, Table 7 and Table 8

It was clarified the assessment of the capture component of this tree only considered the impacts on non-retained species interactions with the rock lobster pots. Interactions with other gear such as Marine Scalefish Fishery gear is not included in this assessment.

This assessment was made considering interactions with lost rock lobster pots, ropes and headlines and vessels used to set those rock lobster pots.

Capture of Non-TEPS species

SZ & NZ - Minor (C1), Remote (L1). Risk Negligible

- This component collated assessment of finfish including snapper that are captured in rock lobster pots and released, sharks & rays (not retained), molluscs, cuttlefish, echinoderms and crustaceans including undersized rock lobster.

- It was considered that in the NZ that pot spikes would reduce the capture of larger species such as sharks and rays.

Capture of TEPS species

The two zones were assessed separately due to the difference in occurrence of some TEPS such as Australia Sea Lions (ASL).

Interactions with TEPS in all South Australian fisheries are reported in Wildlife Interaction reports. SARDI assess the reported interactions annually (see Mackay 2017). There were been no reported interactions with TEPS by the Rock Lobster Fishery in either zone since the last assessment (Mackay 2017).

Southern Zone

Minor (C1), Remote (L1). Risk Negligible

- Interactions of the SZ with TEPS was considered in one component and could include Long-nosed fur seals.
- Noted no reported interactions in the period since the last assessment (Mackay 2017).

Northern Zone

Australia Sea Lions

High (C3), Remote (L1). Risk Low.

- It was considered in the NZ that the mandatory use of pot spikes (sea lion excluder devices (SLEDs)) would reduce the likelihood of interactions with Australian Sea Lions (ASL) and other TEPS. The use of SLEDs has been mandatory in pots used in waters less than 100m in the NZRLF since 1 November 2013. These devices have been shown to adequately prohibit ASL pups from entering rock lobster pots (Goldsworthy et al. 2010).
- It was noted that ASL populations in South Australia had decreased since the last ESD Risk Assessment (Goldsworthy et al. 2015).
- The consequence of the loss of one individual ASL had the potential to have a High consequence (C3) on the population due to the genetic structure of individual colonies. With the mandatory use of pot spikes as a sea lion exclusion device in the NZRLF the likelihood of this high consequence was Remote (L1).

Cetaceans

Southern Right Whales - High (C3). Remote (L1). Risk Low.

Humpback Whales - High (C3). Remote (L1). Risk Low.

- The introduction of winter fishing in the NZ was considered with regard to potential interactions with cetaceans that are known to migrate through the area in winter months.

- Whales are known to migrate to breeding grounds at Head of Bight in winter months and Fowlers Bay is identified as a small established coastal aggregation area for Southern Right Whales (SRW) by the Department of the Environment and Energy (DotEE).
- Entanglements of whales in fishing gear in other Australian states was noted
- There have been no reported interactions with whales in the NZRLF since reporting began in 2007/08 (Mackay 2017).
- Entanglement of an individual SRW, as the main whale species likely to be encountered by the fishery, was considered to not impact on the population of that species. However, such an event was likely to generate short-term public concern, thus the consequence was considered High (C3). The likelihood of this consequence was considered to be Remote (L1).
- The risk ranking for Humpback Whales and other whale species was considered to be not higher than for SRW given the level of species populations. Consequence High (C3) likelihood Remote (L1). Risk Low.

Western Blue Groper and other TEPS

Western Blue Groper - Minor (C1), Remote (L1). Risk Negligible
Other TEPS - High (C3), Remote (L1). Risk Low

- There was no new information for Western Blue Groper (WBG) since the previous risk assessment.
- The fishery was considered to have a negligible impact on WBG (Minor (C1)) and this consequence was remote (L1).
- For other TEPS including other whales, sygnathids etc that may be interact with rock lobster gear and were released was considered in one component.
- The consequence NZ rock lobster fishery on other TEPS was considered to be High (C3) as there could be short-term public concern generated dependant on the species. The likelihood of this consequence was considered to be Remote (L1). Risk Low

Direct interactions but no capture

Minor (C1), Remote (L1). Risk Negligible

Noise interactions with whales - High (C3), Remote (L1). Risk Low

- The non-capture component was considered for both zones of the fishery on TEPS including cetaceans, pinnipeds, turtles, seabirds, white sharks and sygnathids.
- The impact of noise on cetaceans was discussed noting there was not a lot of definitive information available on direct interactions.
- It was noted that the assessment of this component was based on noise from fishing vessel activity, and there were other vessels operating in the same area that also produced noise.

- The general impact of fishery was considered to be minimal at the level of zone noting that care is required in important areas for potentially sensitive species such as calving whales.
- The consequence of noise interactions on cetaceans was considered to be High (C3) as short term public concern may be generated and the likelihood that this consequence would occur was Remote (L1).

4.3 General Ecosystem Impacts of Fishing

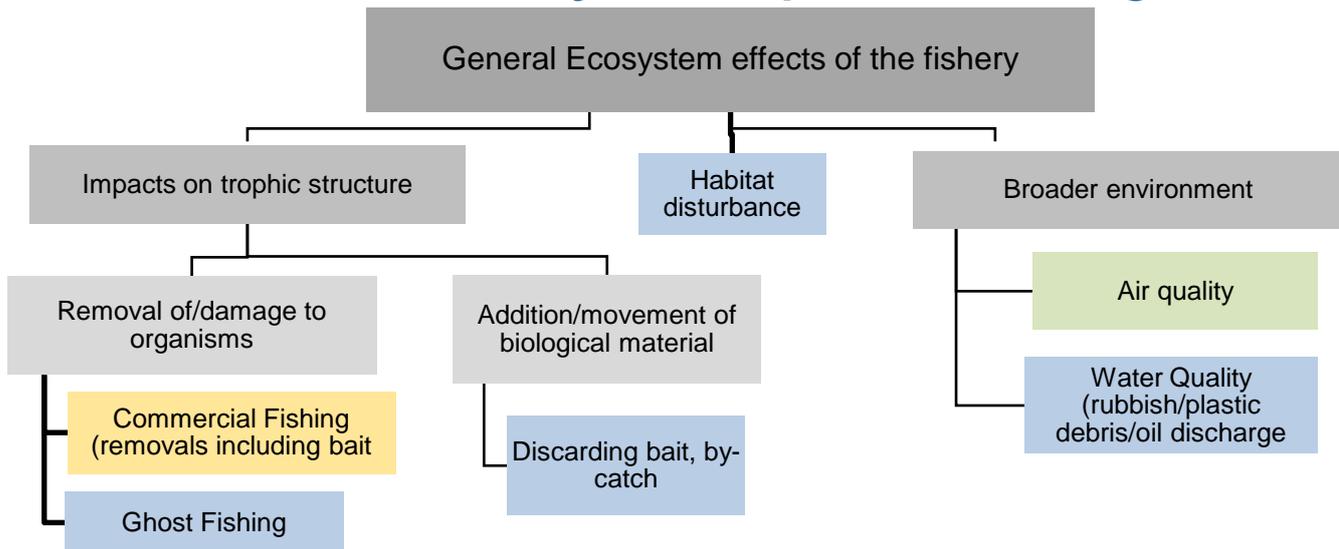


Figure 3. Component Tree for General Ecosystem Impacts of Fishing

Broad objective: Minimise fishery impacts on the ecosystem and habitats

Matrix used Table 4,

Table 9 and

Table 10

- There were no significant changes to the information available related to the risks assessed in this component since the last ESD risk assessment. The risks for these components were maintained from the previous risk assessment report.
- The potential impacts of vessel noise on cetaceans was discussed as a general ecosystem impact, but it was agreed to include this assessment in the non-retained species components (section 0).

Trophic impacts

Commercial Fishing

Moderate (C2), Possible (L3). Risk Medium (most precautionary)

- It was noted there was no evidence of interactions of the fishery on trophic structure or function, noting the paucity of available monitoring to detect changes in trophic structure or function.
- It was considered there was some uncertainty related to current level of impact of the commercial fishery on trophic structures and function related to potential for urchin barrens to occur in South Australian waters.
- It was noted that urchin barrens were apparent in the Tasmanian Rock Lobster fishery and that removal of large predators such as lobster reduced the resilience of kelp beds against the climate-driven threat of the sea urchin (Ling et al. 2009).
- An impact assessment of marine parks in South Australia indicated that urchin densities that can trigger a switch in feeding behaviour to bottom scraping (that can result in barrens) are not likely to occur in South Australia under the current conditions (Econsearch 2012).
- There were no known urchin barrens in South Australia acknowledging that such areas may exist but had not been identified as yet. Marine parks monitoring may provide information that could provide future information on this aspect of the fishery in the future.
- Lobster catch was at historic low levels and thus the risk of trophic level impacts was considered to lower than would have been the case previously.
- In general, it was agreed that the consequence of trophic level impacts of the fishery was Moderate (C2) as it may be at the maximum level of change to the ecosystem structure but with no apparent material change in function.
- There were diverging opinions of workshop participants related to the likelihood of the consequence. Some considered it was not expected that urchin barrens would result from the fishery in the timeframe assessed and therefore it was Unlikely (L2) the consequence would occur.

- Others considered the presence of urchin barrens in Tasmania was evidence that this impact could happen here and the uncertainty related to urchin barrens in South Australia indicated that the likelihood of the consequence was Possible (L3). The most precautionous risk rating (Risk Medium) was adopted in this instance.

Ghost Fishing

Minor (C1), Remote (L1). Risk Negligible

- There is no information on the amount of lost fishing gear from the fishery, however it was considered to be low given the cost of replacing gear resulted in fishers making all effort to retrieve gear.

Discarding

Minor (C1), Remote (L1). Risk Negligible

- The level of bait use was considered to be at the same level as previous assessment and the previous risk rating was adopted.

Habitat disturbance

Minor (C1), Remote (L1). Risk Negligible

- The risk related to habitat disturbance from the fishery was considered to be at the same level as previous assessment and the previous risk rating was adopted.

Broader environment

Air quality

Minor (C1), Likely (L4). Risk Low

- The risk to air quality from the fishery was considered to be at the same level as previous assessment and the previous risk rating was adopted.

Water quality

Minor (C1), Remote (L1). Risk Negligible.

- The major risk related to discarding of plastic from bait packaging. It was noted that handling of bait packaging was included in the industry Clean Green accreditation scheme which many of the fishers held.
- The level of bait use had not increased from the previous assessment and the previous risk rating was adopted.

4.4 External Factors Affecting Performance of the

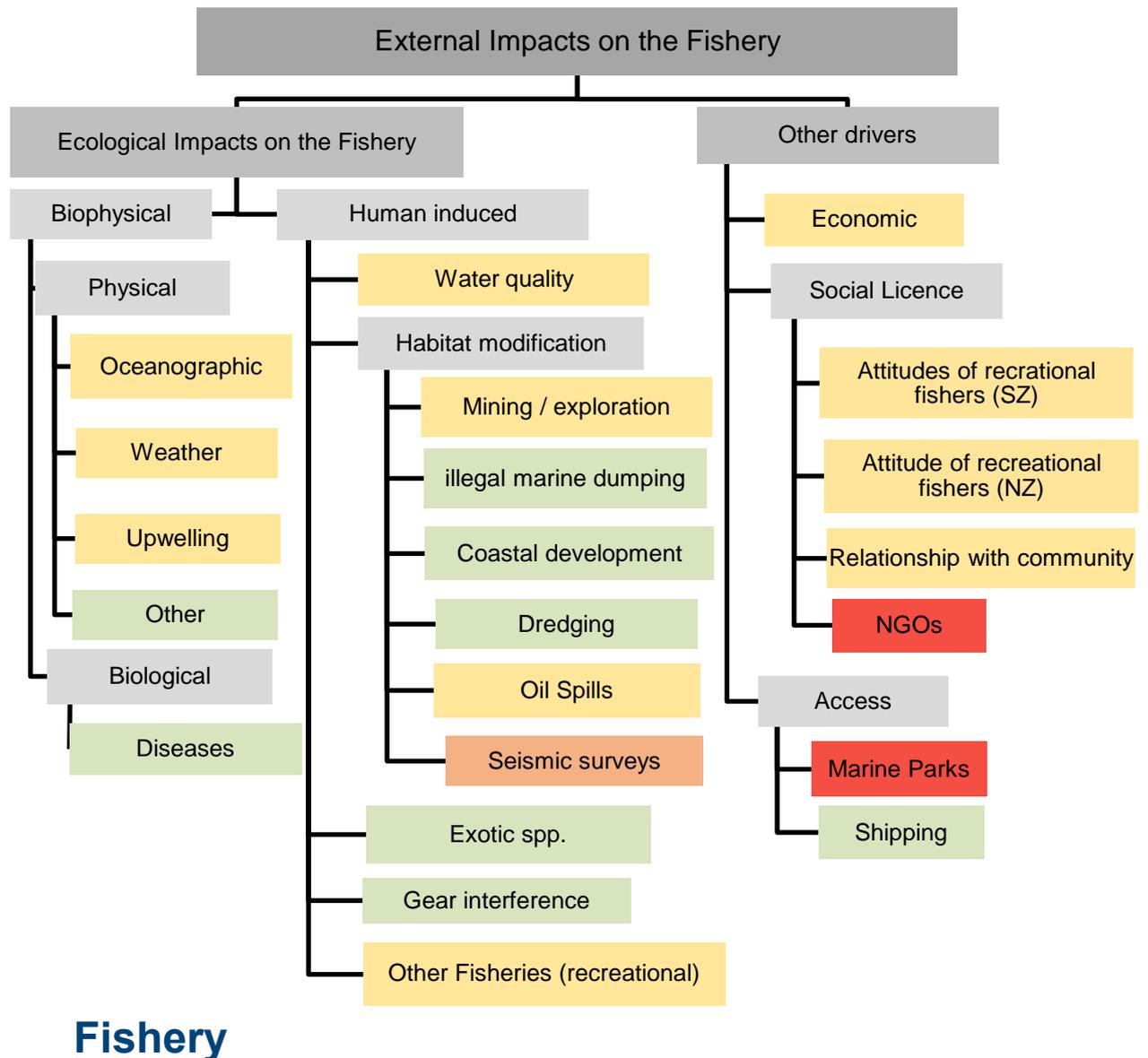


Figure 4. Component Tree for External Factors Affecting Performance of the Fishery

Broader objective: minimise impacts of external drivers on fishery performance

Matrix used: Table 4, Table 6 and Table 11 Ecological impacts on the fishery

Biophysical

Oceanographic, weather, upwellings - Moderate (C2), Likely (L4). Risk Medium

Other (climate change, temperature) - Moderate (C2), Unlikely (L2). Risk Low.

Disease - Major (C4), Remote (L1) Risk Low.

- Oceanographic conditions were considered to have a major impact on the fishery. El Niño oscillations, swell and water temperature are thought to change the behaviour of lobster. At this time, however, the patterns of these changes or the level of change is not known.
- Weather is also known to impact on the fishery through impacting on fishing efficiency, available fishing time and catch rates.
- The risk of disease impacting on the performance of the fishery was considered to be the same as for the previous risk assessment and the previous risk rating adopted.

Human induced ecological impacts

Mining activities - Moderate (C2), Possible (L3). Risk Medium

Illegal marine dumping, coastal development, dredging, gear interference - Minor (C1), Likely (L4). Risk Low

Exotic species – Major (C4), Remote (L1). Risk Low

- These components (with the exception of the impact of recreational fishing on the commercial fishery, seismic surveys, water quality and oil spills) were considered to have not changed significantly since the last assessment, and the previous risk rankings were adopted. The consequence and likelihood scores were converted from the previous scoring matrix.

Water quality

High (C3), unlikely (L2). Risk Medium.

- There were divergent views recorded at the workshop on the consequence of water quality from Moderate to High. The most precautionary score was adopted.

Seismic Surveys

High (C3), Likely (L4). Risk High.

- Seismic surveys were considered by some participants as already having an impact on the fishery as indicated by research reported seismic surveys impacting on Rock Lobster sensory organs and recent information related to mortality of zooplankton (Day et al. 2016; McCauley et al. 2017). While it was not demonstrated that these impacts had affected the performance of the fishery in South Australia it was considered that there was a level of risk.

Recreational fishing

Moderate (C2), Likely (L4). Risk Medium

- This was a new component added to this assessment.
- The estimated recreational catch was at the allocated level of access (4.5%) as reported in the 2013/14 recreational fishing survey (Giri and Hall 2015).
- It was Likely (L4) that the impact of recreational fishing was at the maximum acceptable level that would still meet the objectives (Moderate (C2)). Risk Medium

Oil Spills

Oil Spills - Major (C4), Remote (L2). Risk Medium

- This was a new component added to this assessment.

- The likelihood of an oil spill was considered unlikely (L2) however it was acknowledged that oil spills had occurred elsewhere. The potential consequence was considered major

Other drivers

Economic - Moderate (C2), Likely (L4). Risk Medium

Commercial Shipping - Minor (C1), Likely (L4). Risk Low

- The impacts related to economics (fuel prices, markets and labour forces) and commercial shipping were considered to be unchanged from the previous assessment and the previous risk rating adopted.
- Access to fishing areas were considered by way of access to marine park no-take zones, issues related to increased commercial shipping activity in areas of fishing activity.

No-take Zones

Major (C4), Likely (L4). Risk Severe (most precautionary).

- Access to no-take zones of marine parks was considered both from a view of the impact on the fishery from implementation of the current zoning arrangements, as well as the potential for increases in no-take zones in the future.
- Out-of-session discussions with representatives from the Conservation Council of South Australia (CCSA), and the Department for Environment and Water (DEW) provided risk scores for marine parks in both the SZ and NZ being Minor consequence (C1) and likelihood Remote (L4). Risk Low. However, economic impact of these no-take zones through changing catch rates may be rated as a Moderate consequence (C2) with a Possible (L3) likelihood. Risk Medium. These scores were provided by CCSA and DEW taking into consideration the voluntary buy-back program⁴ had met or exceeded the recommended targets set, the outcomes of the Regional Impact Assessment for some areas of SA indicating no significant impacts on communities and that the quota had been reached in both zones since implementation of the marine park zones. It was also noted that the SZ was less impacted by marine park no-take zones. A survey of rock lobster abundance at Cape de Couedic also reported that catch rates inside and outside the relevant sanctuary zones were not significantly different prior to implementation of marine parks sanctuary zones (McLeay et al. 2017).
- Participants at the workshop of 23 July 2018 considered the consequence outcomes from marine park no-take zones were significantly higher than those suggested by CCSA and DEW. It was the workshops view that the consequence of the removal of access to no-take zones had a Major consequence (C4) on the fishery in both the SZ and NZ as they had been

⁴ Information on the Commercial Fisheries Voluntary Catch/Effort Reduction Program available on http://www.pir.sa.gov.au/fishing/commercial_fishing/licensing_registration/catch_effort_reduction_program

unable to achieve of more than one key deliverable in their strategic direction. The deliverables were related to performance of the fishery in the areas that remain open to fishing from a perception from industry that fishing in the areas that remain open to fishing is less profitable. A risk impact assessment survey (Kosturjak 2015) did not identify negative economic impact from the introduction of sanctuary zones. However, this study noted the short timeframe and limited fishery data limited the ability to identify impacts and noted that short-term movements in performance indicators may reflect statistical noise rather than a response to policy. A precautionary approach therefore in the absence of more definitive information was taken in this instance.

- As industry participants consider that these effects are already being felt within the fishery, at least in some areas, or some fishers. the likelihood of this consequence was considered Likely (L4). Risk Severe.
- The diverging views were recorded and the worst score adopted for the risk assessment, ie Risk Severe.

Social Licence

Attitudes of recreational fishers (NZ/SZ) - Moderate (C2), Possible (L3). Risk Medium.

Relationship with local communities - Moderate (C2), Possible (L3). Risk Medium.

NGOs - Major (C4), Possible (L3). Risk Severe (most precautionary)

- Attitudes of recreational fishers in the NZ and SZ were considered as new elements of the external factors component tree in this assessment. It was considered that some public embarrassment for the fishery may be incurred from attitudes of recreational fishers in both zones that could result in minor ministerial involvement.
- The relationship of the commercial fishing industry with local communities was considered to be of similar risk to that recorded for recreational fishers.
- The impact of NGO's on the social licence of the fishery was discussed out-of-session with a representative from the CCSA who considered that the consequence of NGOs on the rock lobster fisheries was Moderate (C2) in light of the communication channels the industry had with local NGOs such as CCSA and the inclusion of a conservation member on the RLFMAC. The likelihood of this consequence was considered by CCSA to be Possible (L3) Risk Medium.
- Participants at the workshop of 23 July 2018 considered the consequence outcomes NGOs were significantly higher than those suggested by CCSA noting that there were a range of NGOs in Australia that may have different focus to CCSA. In considering the example of the significant attention about large vessels operating in the Commonwealth managed Small Pelagic Fishery, it was the workshops view that the consequence of impacts of NGOs on the social licence of the fishery was Major (C4) and the likelihood of this consequence was Possible (L3), as there was evidence that this had occurred

in other areas (Commonwealth Fisheries) and may occur in some circumstances within the timeframe. Risk Severe.

- The diverging views were recorded and the worst score adopted for the risk assessment, ie Risk Severe.

4.5 Community

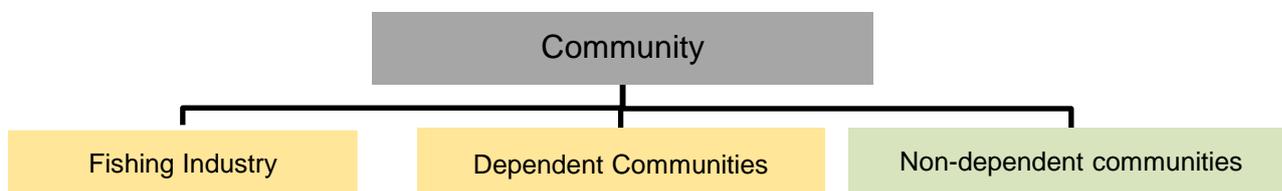


Figure 5. Component Tree for Community

Matrix used: Table 4, Table 11, Table 13, Table 14 and Table 15

It was noted that this section of risk assessment in the 2011 process was not assessed qualitatively for risks using consequence and likelihood values. Rather, issues (components) were assigned a risk rating by industry based on their impression of how important the issue was.

It should be noted many of the drivers related to many of these components are beyond the scope of the fisheries management plans.

It was agreed that this assessment would score the high level components in this tree using the scoring framework provided in Appendix 1.

Fishing Industry

Major (C4), Unlikely (L2). Risk Medium

- This component considered flow on impacts of the fishery on the fishing industry including direct employment and household incomes of industry members.

Dependent Communities

Major (C4), Unlikely (L2). Risk Medium

- This component considered flow on impacts of the fishery on the dependent communities such as Port Lincoln and Beachport including in-direct employment and household incomes.

Non-dependent Communities

Moderate (C2), Unlikely (L2). Risk Low

- It was considered that non-dependent communities were less reliant on the fishery and therefore the potential consequence was lower than for dependent communities.

4.6 Governance

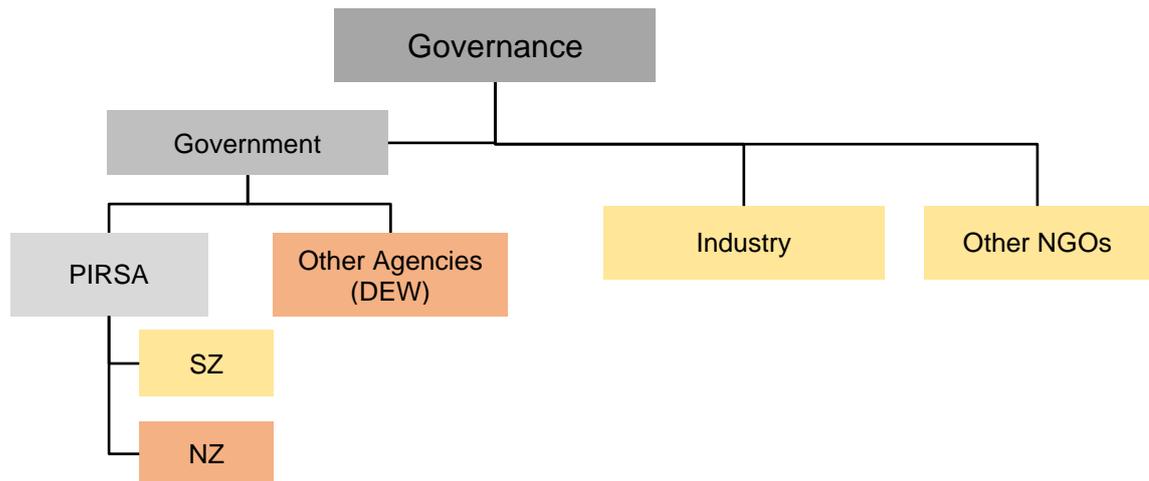


Figure 6. Component Tree for Governance

Matrix used: Table 4 and

Table 16

It was noted that this section of risk assessment in the 2011 process was not assessed qualitatively for risks using consequence and likelihood values.

It was agreed that this assessment would score the high level components in this tree using the scoring framework provided in Appendix 1.

Government

PIRSA

SZ - Moderate (C2), Possible (L3). Risk Medium.

NZ - High (C3), Possible (L3). Risk High (most precautionary).

- The impact of the Governance structures related to PIRSA was considered separately for the two zones related to impacts of PIRSA policy and management on operational effectiveness of the fishery. The issues raised were in regard to management arrangements that impact on operational efficiency
- There were divergent views of the consequence (C2/C3) related to the Northern Zone considered at the meeting. The most precautionary risk score was adopted.

Other Government Agencies

NZ - High (C3), Possible (L3). Risk High (most precautionary).

- Out-of-session discussions with representatives from DEW provided comments on risk associated with governance of other government agencies such as DEW being Minor consequence (C1) was Likely (L4). Risk Medium. These scores were provided in consideration that governance arrangements in place were defined in legislation and therefore provided certainty to stakeholders.
- The workshop participants considered the consequence could be High (C3), however the likelihood of this consequence was Possible (L3). Risk High.
- The diverging views were recorded and the worst score adopted for the risk assessment, ie Risk High.

Industry Association

Major (C4), Unlikely (L2). Risk Medium.

- The workshop participants considered that the governance arrangements of the industry associations could strongly impact on the fishery outcomes.

Other NGOs

High (C3), Unlikely (L2). Risk Medium (most precautionary)

- Out-of-session discussions with a representative from the Conservation Council of South Australia provided comments on risk associated with governance of other NGOs being Moderate consequence (C2) was Possible (L3). Risk Medium. These scores were provided in consideration that NGOs governance

arrangements could vary greatly over different organisations and that NGOs could cause some public embarrassment to the fishery.

- The workshop participants considered the consequence could be High (C3), however the likelihood of this consequence was Unlikely (L2). Risk Medium.
- The overall risk rating was the same ie Risk Medium

4.7 Aboriginal Community

The Aboriginal traditional component of the ESD Risk Assessment was not undertaken during this process, and a separate ESD Risk Assessment will be conducted under the Aboriginal Traditional Fishing Management Plan.

4.8 Summary of risk ratings

A summary table of consequence and likelihood scores are provided in Table 1 and a summary of risks are provided in Table 2.

Table 1: Summary table of consequence and likelihood scores from 2018 Rock Lobster ESD Risk Assessment

Components	Consequence	Likelihood	Risk
Retained Species			
Southern rock lobster – NZ	2	4	M
Southern rock lobster – SZ	2	4	M
Giant Crab - NZ	1	3	L
Giant Crab - SZ	1	4	L
Octopus – NZ	1	4	L
Octopus – SZ	2	2	L
Gummy Shark (NZ and SZ)	1	1	N
School Shark (NZ and SZ)	1	1	N
Scalefish (inc bait, crustaceans, molluscs)	1	1	N
Non-Retained Species			
Capture – TEPS – SZ	1	1	N
Capture – TEPS – NZ – Australian sea lion	3	1	L
Capture – TEPS – NZ – Southern right whale	3	1	L
Capture – TEPS – NZ – Humpback whale	3	1	L
Capture – TEPS – NZ – Western blue groper	1	1	N
Capture – TEPS – NZ – Other	3	1	L
Capture – Non-TEPS	1	1	N
Non-Capture – TEPS	1	1	N
Non-Capture – Noise impact on cetaceans	3	1	L
General Ecosystem effects			
Tropic Structure - Commercial fishing	2	2/3	M
Tropic Structure - Ghost fishing	1	1	N
Addition/movement of biological material	1	1	N
Habitat disturbance	1	1	N
Broader Environment - Air quality	1	4	L
Broader Environment - Water quality	1	1	N
External factors effecting performance of the fishery			
Ecological - Oceanographic	2	4	M
Ecological - Weather	2	4	M
Ecological - Upwellings	2	4	M
Ecological – Other	2	2	L

Components	Consequence	Likelihood	Risk
Ecological - Diseases	4	1	L
Human Induced - Water quality	3/2	2	M
Human Induced - Mining / exploration activities	2	3	M
Human Induced - Illegal marine dumping	1	4	L
Human Induced - Coastal development	1	4	L
Human Induced - Dredging	1	4	L
Human Induced – Oil Spills	4	2	M
Human Induced – Seismic Surveys	3	4	H
Human Induced - Exotic species	4	1	L
Human Induced - Gear interference	1	4	L
Human Induced – Other Fisheries (recreational)	2	4	M
Other - Economic	2	4	M
Social Licence – Attitudes of Recreational Fishers (NZ & SZ)	2	3	M
Social Licence – relationship with local communities	2	3	M
Social Licence – NGOs	2/4	3	S
Access - Marine parks (NZ &SZ)	1/2/4	4/3/4	S
Access – Shipping	1	4	L
Community			
Fishing Industry	4	2	M
Dependent Communities	4	2	M
Non-Dependent Communities	2	2	L
Governance			
PIRSA – SZ	2	3	M
PIRSA – NZ	2/3	3	H
Other Government Agencies	1/3	4/3	H
Industry Associations	4	2	M
Other – NGOs	2/3	3/2	M

5 Risk Evaluation

A total of 56 issues associated with the South Australian Rock Lobster Fishery were scored for risk across four principles: ecological, external factors, community wellbeing and governance. The majority of issues were evaluated as medium or low risk (Table 2). The majority of issues were identified in the External Factors component tree.

Table 2: Summary of ESD Risk outcomes for Rock Lobster Fishery

Component Trees	Severe	High	Medium	Low	Negligible	Total
Retained Species	0	0	2	4	5	11
Non-retained species	0	0	0	5	4	9
General Ecosystem	0	0	1	1	4	6
General Community	0	0	2	1	0	3
Governance	0	2	3	0	0	5
External Factors	2	1	11	8	0	22
Total	2	3	19	19	13	56

6 Risk Treatment

Risks identified as negligible or low (equating to 32 of the 56 identified issues) are considered acceptable and require no specific actions to mitigate the identified risk.

There were 24 issues scored as medium risk or higher. Risks identified as medium are considered acceptable and do not require additional management actions to mitigate those risks. These risks are reported in Table 3 to provide further information on reporting and monitoring activities associated with these issues.

Risks categorised as High or severe require consideration of management actions to be implemented to mitigate risk if practicable. A summary of the issues identified as medium risk or higher with associated options for monitoring, reporting or management actions is provided in Table 3.

Table 3: Risk treatment options for medium, high and severe risks.

Components	Risk	Reporting and Monitoring	Management Actions
Retained Species			
Southern rock lobster – NZ	Medium	Continue current fisheries dependant and independent monitoring.	Maintain current management practices as described in the relevant management plans. Continue implementation of annual TACC setting guided by agreed harvest strategy
Southern rock lobster – SZ	Medium	Continue with regular reporting	
Non-Retained Species			
Nil			
General Ecosystem effects			
Tropic Structure - Commercial fishing	Medium	Continue current fisheries dependant and independent monitoring of target, by-catch and by-product. Continue with regular reporting	Maintain current management practices as described in the relevant management plans.
External factors effecting performance of the fishery			
Ecological - Oceanographic	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Ecological - Weather	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Ecological - Upwellings	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Human Induced - Water quality	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Human Induced - Mining / exploration activities	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans

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Components	Risk	Reporting and Monitoring	Management Actions
Human Induced – Oil Spills	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Human Induced – Seismic Surveys	High	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Human Induced – Other Fisheries (recreational)	Medium	Continue with regular monitoring and reporting of recreational catch. Consider improvements to recreational monitoring methods where practicable and effective	Maintain management arrangements for commercial and recreational fishers
Other - Economic	Medium	Continue with regular monitoring and reporting of economic performance of commercial fishery	Consider economic factors in decision making for changed management arrangements
Social Licence – Attitudes of Recreational Fishers (NZ/SZ)	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain membership for recreational member on recognised Fishery Management Advisory Committee. Undertake consultation where appropriate
Social Licence – relationship with local communities	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain membership for recreational member on recognised Fishery Management Advisory Committee Undertake consultation where appropriate
Social Licence – NGOs	Severe	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain membership for non-commercial stakeholders on recognised Fishery Management Advisory Committee.
Access - Marine parks (NZ &SZ)	Severe	Marine Parks legislations is the responsibility of the Department for Environment and Water. Assist were appropriate with marine parks monitoring and assessment	Marine Parks legislations is the responsibility of the Department for Environment and Water.
Community			
Fishing Industry	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans

Components	Risk	Reporting and Monitoring	Management Actions
Dependent Communities	Medium	Influenced by factors outside PIRSA. Continue with current monitoring and reporting	Maintain current management practices as described in the relevant management plans
Governance			
PIRSA – SZ	Medium	Maintain co-management arrangements between PIRSA and industry	Maintain co-management arrangements between PIRSA and industry
PIRSA – NZ	High	Maintain co-management arrangements between PIRSA and industry	Maintain co-management arrangements between PIRSA and industry
Other Government Agencies	High	Influenced by factors outside PIRSA.	Influenced by factors outside PIRSA.
Industry Associations	Medium	Influenced by factors outside PIRSA.	Influenced by factors outside PIRSA.
Other – NGOs	Medium	Influenced by factors outside PIRSA.	Influenced by factors outside PIRSA.

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8 Appendices

Appendix 1: Likelihood and Consequence Tables

Likelihood and Consequence tables are based on AS 4360 / ISO 31000, and are modified from Fletcher et al. (2011) and Fletcher (2015)

Table 4: Likelihood Definitions

1	Remote	The consequence has never been heard of in these circumstances, but it is not impossible within the timeframe (Probability <5%).
2	Unlikely	The consequence is not expected to occur in the timeframe but it has been known to occur elsewhere under special circumstances (Probability 5 - <20%).
3	Possible	Evidence to suggest this consequence level is possible and may occur in some circumstances within the timeframe (Probability 20 - <50%).
4	Likely	A particular consequence level is expected to occur in the timeframe (Probability ≥50%).

Table 5: General Consequence Table

Generic		
1	Minor	Measurable but minimal impacts that are highly acceptable and easily meet objective.
2	Moderate	Maximum acceptable level of impact that would still meet the objective.
3	High	Above acceptable level of impact. Broad and/or long-term negative effects on objective which may no longer be met. Restoration can be achieved within a short to moderate time frame.
4	Major	Well above acceptable level of impact. Very serious effects on objective which is clearly not being met and may require a long restoration time or may not be possible.

Table 6: Consequence categories for the Major Retained/Non-Retained Species

Ecological: Target/Retained Species		
1	Minor	Fishing impacts either not detectable against background variability for this population; or if detectable, minimal impact on population size and none on dynamics. Spawning biomass > Target level
2	Moderate	Fishery operating at maximum acceptable level of depletion. Spawning biomass < Target level but > Threshold level (B_{MSY})
3	High	Level of depletion unacceptable but still not affecting recruitment levels of stock. Spawning biomass < Threshold level (B_{MSY}) but > Limit level (B_{REC})
4	Major	Level of depletion is already affecting (or will definitely affect) future recruitment potential of the stock. Spawning biomass < Limit level (B_{REC})

Table 7: Consequence categories for the By-Product Species/Minor Non-retained species

Ecological: Non-Retained (Bycatch) Species		
1	Minor	Species assessed elsewhere and/or take is very small and area of capture small compared with known distribution (< 20%).
2	Moderate	Relative area of, or susceptibility to, capture is < 50% and species do not have a vulnerable life history.
3	High	N/A - Once a consequence reaches this point, it should be examined using target/retained species table.
4	Major	N/A.

Table 8: Consequence levels for the impact of a fishery on Protected species

Ecological: Threatened, Endangered and Protected Species (TEPS)		
1	Minor	Few individuals directly impacted in most years, level of capture/interaction is well below that which will generate public concern.
2	Moderate	Level of capture is the maximum that will not impact on recovery or cause unacceptable public concern.
3	High	Recovery may be affected and/or some clear, but short-term public concern will be generated.
4	Major	Recover times are clearly being impacted and/or public concern is widespread.

Table 9: Consequence levels for the impacts of a fishery on habitats

4. Ecological: Habitat		
1	Minor	Measurable impacts but very localized. Area directly affected well below maximum accepted.
2	Moderate	Maximum acceptable level of impact to habitat with no long-term impacts on region-wide habitat dynamics.
3	High	Above acceptable level of loss/impact with region-wide dynamics or related systems may begin to be impacted.
4	Major	Level of habitat loss clearly generating region-wide effects on dynamics and related systems.

Table 10: Consequence levels for the impact of a fishery on the general ecosystem/trophic levels

Ecological: Ecosystem/Environment		
1	Minor	Measurable but minor changes to the environment or ecosystem structure but no measurable change to function.
2	Moderate	Maximum acceptable level of change to the environment or ecosystem structure with no material change in function.
3	High	Ecosystem function altered to an unacceptable level with some function or major components now missing and/or new species are prevalent.
4	Major	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.

Table 11: Consequence levels for economic impacts on fishery

6. Economic		
1	Minor	A small, measurable but temporary impact on the economic pathways for the industry or the community.
2	Moderate	Some level of reduction for a major fishery or a large reduction in a small fishery that the community is not dependent upon.
3	High	Major sector decline and economic generation with clear flow on effects to the community.
4	Major	Permanent and widespread collapse of economic activity for industry and the community including possible debts.

Table 12: Consequence levels for public reputation factors

7. Public Reputation & Image		
1	Minor	Low negative impact and news profile.
2	Moderate	Some public embarrassment, moderate news profile and minor ministerial involvement.
3	High	High public embarrassment, high impact and news profile, third-party actions, public and significant ministerial involvement.
4	Major	Extreme public embarrassment, prolonged news coverage, third-party actions/enquiry and government censure.

Table 13: Consequence levels for Safety and Health

8. Safety & Health		
1	Minor	First aid only.
2	Moderate	Some minor medical treatment required, visit to doctor's surgery. Less than a week off work.
3	High	Hospitalisation and/or intensive and extended treatment period required for recovery.
4	Major	Serious or extensive injuries, disease, permanent disability or death.

Table 14: Consequence levels for lifestyle factors

9. Social Amenity & Lifestyle		
1	Minor	Temporary or minor additional stakeholder restrictions or loss of expectations (< 1 year).
2	Moderate	Ongoing restrictions or decrease in expectations.
3	High	Long-term suspension or restriction of expectations in some key activities.
4	Major	Permanent loss of all expectations in key activities.

Table 15: Consequence levels for impacts on community

10. Community (Social Structures & Culture)		
1	Minor	Impacts may be measurable but minimal concerns.
2	Moderate	Clear impacts but no local communities threatened or social dislocations.
3	High	Major impacts at least at a local level, with disruptions now evident.
4	Major	Impacts occurring at a broader (regional) level or severe local impacts.

Table 16: Consequence levels for operational effectiveness

11. Operational Effectiveness		
1	Minor	Minor delay in achievement of a key deliverable.
2	Moderate	Minor element of one key deliverable unable to be achieved on time.
3	High	Significant delay but achievement of key deliverable.
4	Major	Non-achievement of more than one key deliverable, or major delay to entire strategic directive.

Table 17: Risk Matrix

Consequence x Likelihood Risk Matrix		Likelihood			
		Remote (1)	Unlikely (2)	Possible (3)	Likely (4)
Consequence	Minor (1)	Negligible	Negligible	Low	Low
	Moderate (2)	Negligible	Low	Medium	Medium
	High (3)	Low	Medium	High	High
	Major (4)	Low	Medium	Severe	Severe

Appendix 2: Workshop details

Workshop 19 June 2018

Participants

- Emily Fisher – Facilitator
- Emily Rowe – NZRLF industry
- Aaron Whittle - NZRLF industry
- Kyri Toumazos – EO South Australian Northern Zone Rock Lobster Fishermen's Association
- Nathan Kimber – EO South Eastern Professional Fishermen's Association.
- James Brook – Conservation Council of South Australia
- Anissa Lawrence – Conservation member Rock Lobster Fishery Management Advisory Committee
- Patricia von Baumgarten - Department for Environment and Water
- Lachy McLeay - SARDI
- Mike Steer – SARDI
- Simon Goldsworthy – SARDI
- Annabel Jones PIRSA
- Andrew Smith – Recreational member RLFMAC
- Adrian Linnane - SARDI

Apologies

- Simon Peters – SZ Industry

Workshop (cont) 23 July 2018

Participants

- Emily Rowe – NZRLF industry
- Aaron Whittle – NZRLF industry
- Kyri Toumazos – EO NZRLF
- Nathan Kimber – EO SEPFA
- Anissa Lawrence (by phone) – Conservation member RLFMAC
- Adrian Linnane - SARDI
- Mark Fabris (SZRLF RLFMAC member)

Apologies

- Patricia von Baumgarten - Department of Environment and Water
- Simon Peters – SZ Industry
- Andrew Sneath – SZ Industry
- Andrew Smith – Recreational fishery

Out-of-session meeting with individual participants

- James Brook – Conservation Council of South Australia
- Simon Bryars – Department for Environment and Water

