Seafood Risk Assessment

Queensland East Coast Otter Trawl Fishery

Prepared for the Fisheries Research and Development Corporation

Assessment Summary

Queensland East Coast Otter Trawl Fishery	Unit/s of Assessment:	
	Product Name/s:	***Eastern King Prawn, Moreton Bay Bugs, Balmain Bugs***
	Species:	*Melicertus plebejus, Thenus spp., Ibacus spp.*
	Stock:	Eastern King Prawn – Eastern Australia Moreton Bay Bugs – Queensland Balmain Bugs – Queensland/New South Wales
	Gear type:	Demersal trawl
	Year of Assessment:	2017

Fishery Overview

This summary is adapted from adapted from DEEDI (2012):

The Queensland East Coast Otter Trawl Fishery (ECOTF) targets prawns, scallops, bugs and squid. Various byproduct (permitted) species are also retained by the fleet. The ECOTF is the largest fishery in Queensland, both in terms of the volume of product caught and economic value of the product.

The ECOTF covers all tidal waters (excluding estuaries) east of longitude 142°31.89'E out to the East Coast Offshore Constitutional Settlement (OCS) Boundary between Cape York and the Queensland/New South Wales (NSW) border. The type of fishery symbol attached to a commercial fishing licence delimits the area that can be fished.

Figure 1: Area of the Queensland East Coast Trawl Fishery (DEEDI, 2012)

Demersal otter trawling is used in the fishery with variations to the standard prawn trawl gear allowed under the Trawl Plan. For example, stronger net and ground gear is permitted when targeting scallops to reduce shell cuts; and to account for the larger size of scallops compared to prawns.

Triple and quad net arrangements (three or four towed nets) are frequently used in the fishery depending on the species targeted, fishing conditions and length of the net allowed under the Trawl Plan. Queensland east coast otter trawlers have traditionally used flat, rectangular 'otter' boards to spread their nets, but there is an increasing tendency to use more streamlined and smaller boards.

The fishery is managed by a range of input (effort) and output (harvest) controls directed at ensuring the ecologically sustainable harvest of target and by-product species whilst minimising the impacts on bycatch and the environment.

Scoring

Performance Indicator	Eastern King Prawn	Moreton Bay Bugs	Balmain Bugs
COMPONENT 1			
1A: Stock Status	LOW RISK	MEDIUM RISK	MEDIUM RISK
1B: Harvest Strategy	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
1C: Information and Assessment	LOW RISK	MEDIUM RISK	MEDIUM RISK
OVERALL	MEDIUM RISK	MEDIUM RISK	MEDIUM RISK
COMPONENT 2			
2A: Non-target Species	MEDIUM RISK	MEDIUM RISK	MEDIUM RISK
2B: ETP Species	MEDIUM RISK	MEDIUM RISK	MEDIUM RISK
2C: Habitats	MEDIUM RISK	LOW RISK	MEDIUM RISK
2D: Ecosystems	LOW RISK	LOW RISK	LOW RISK
OVERALL	MEDIUM RISK	MEDIUM RISK	MEDIUM RISK
COMPONENT 3			
3A: Governance and Policy	LOW RISK	LOW RISK	LOW RISK
3B: Fishery-specific Management System	MEDIUM RISK	MEDIUM RISK	MEDIUM RISK
OVERALL	MEDIUM RISK	MEDIUM RISK	MEDIUM RISK

Summary of main issues

- There have been no quantitative stock assessments of Moreton Bay Bugs or Balmain Bugs
- A key challenge in the harvest strategy across all stocks is the existence of considerable unused harvesting capacity, with around half of the available effort units in the fishery unused in recent years. Few mechanisms currently exist to control and manage effort shifts within the fishery (either geographically or by target species). While substantial spatial closures in the GBRMP may provide sufficient protection to maintain most of the target species above PRI, this may not be the case for EKP which are largely harvested south of the GBRMP where there are fewer closures.
- No well-defined species-specific HCRs are in place for any of the stocks.
- There are currently no mechanisms to independently validate catch and effort and Species of Conservation Interest (SOCI) logbooks
- There is no current ongoing monitoring of non-retained species composition or abundance, or interactions with ETP species.

Outlook

Eastern King Prawns

Component	Outlook	Comments
Target species	Improving	Harvest strategies with well-defined harvest control rules will be developed by 2018 as part of the Queensland Government's *Queensland Sustainable Fisheries Strategy 2017-2027*.
Environmental impact of fishing	Improving	The outcomes of an ecological risk assessment for the fishery south of the GBRMP, as well as other bycatch and discards research, should be available for future assessments. Additional mechanisms to validate fisher reporting will be developed as a priority under the *Queensland Sustainable Fisheries Strategy 2017-2027.*
Management system	Improving	Stakeholder engagement processes will be strengthened and fishery specific objectives will be developed as part of the *Queensland Sustainable Fisheries Strategy 2017-2027.* The MCS system is moving increasingly towards an intelligence and risk-drive model.

Moreton Bay Bugs

Component	Outlook	Comments
Target species	Improving	Harvest strategies with well-defined harvest control rules will be developed by 2018 as part of the Queensland Government's *Queensland Sustainable Fisheries Strategy 2017-2027*.
Environmental impact of fishing	Improving	The outcomes of an ecological risk assessment for the fishery south of the GBRMP, as well as other bycatch and discards research, should be available for future assessments. Additional mechanisms to validate fisher reporting will be developed as a priority under the *Queensland Sustainable Fisheries Strategy 2017-2027.*
Management system	Improving	Stakeholder engagement processes will be strengthened and fishery specific objectives will be developed as part of the Queensland Sustainable Fisheries Strategy 2017-2027. The MCS system is moving increasingly towards an intelligence and risk-drive model.

Balmain Bugs

Component	Outlook	Comments
Target species	Improving	Harvest strategies with well-defined harvest control rules will be developed by 2018 as part of the Queensland Government's *Queensland Sustainable Fisheries Strategy 2017-2027*.
Environmental impact of fishing	Improving	The outcomes of an ecological risk assessment for the fishery south of the GBRMP, as well as other bycatch and discards research, should be available for future assessments. Additional mechanisms to validate fisher reporting will be developed as a priority under the *Queensland Sustainable Fisheries Strategy 2017-2027.*
Management system	Improving	Stakeholder engagement processes will be strengthened and fishery specific objectives will be developed as part of the Queensland Sustainable Fisheries Strategy 2017-2027. The MCS system is moving increasingly towards an intelligence and risk-drive model.

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Disclaimer

This assessment has been undertaken in a limited timeframe based on publicly available information. Although all reasonable efforts have been made to ensure the quality of the report, neither this company nor the assessment' s authors warrant that the information contained in this assessment is free from errors or omissions. To the maximum extent permitted by law, equity or statute, neither this company nor the authors accept any form of liability, be it contractual, tortious or otherwise, for the contents of this report or for any consequences arising from misuse or any reliance placed on it.

Background

This report sets out the results of an assessment against a seafood risk assessment procedure, originally developed for Coles Supermarkets Australia by MRAG Asia Pacific. FRDC is grateful for Coles' permission to use its Responsibly Sourced Seafood Framework. The aim of the procedure was to allow for the rapid screening of uncertified source fisheries to identify major sustainability problems, and to assist seafood buyers in procuring seafood from fisheries that are relatively well-managed and have lower relative risk to the aquatic environment. It uses elements from the GSSI benchmarked MSC Fishery Standard version 2.0, but is neither a duplicate of it nor a substitute for it. The methodology used to apply the framework differs substantially from an MSC Certification. Consequently, any claim about the rating of the fishery based on this assessment should not make any reference to the MSC.

This report is a "live" document that will be reviewed and updated on an annual basis.

Methods

Risk Assessment

Detailed methodology for the risk assessment procedure is found in MRAG AP (2015). The following provides a brief summary of the method as it relates to the information provided in this report.

Assessments are undertaken according to a 'unit of assessment' (UoA). The UoA is a combination of three main components: (i) the target species and stock; (ii) the gear type used by the fishery; and (iii) the management system under which the UoA operates.

Each UoA is assessed against three components:

1. Target fish stocks;
2. Environmental impact of fishing; and
3. Management system.

Each component has a number of performance indicators (PIs). In turn, each PI has associated criteria, scoring issues (SIs) and scoring guideposts (SGs). For each UoA, each PI is assigned one of the following scores, according to how well the fishery performs against the SGs:

- Low risk;
- Medium risk;
- Precautionary high risk; or
- High risk

Scores at the PI level are determined by the aggregate of the SI scores. For example, if there are five SIs in a PI and three of them are scored low risk with two medium risk, the overall PI score is low risk. If three are medium risk and two are low risk, the overall PI score is medium risk. If there are an equal number of low risk and medium risk SI scores, the PI is scored medium risk. If any SI scores precautionary high risk, the PI scores precautionary high risk. If any SI scores high risk, the PI scores high risk.

For this assessment, each component has also been given an overall risk score based on the scores of the PIs. Overall risk scores are either low, medium or high. The overall component risk score is low where the majority of PI risk scores are low. The overall risk score is high where any one PI is scored high risk, or two or more PIs score precautionary high risk. The overall risk score is medium for all other combinations (e.g. equal number of medium/low risk PI scores; majority medium PI scores; one PHR score, others low/medium).

Outlook

For each UoA, an assessment of the future 'outlook' is provided against each component. Assessments are essentially a qualitative judgement of the assessor based on the likely future performance of the fishery against the relevant risk assessment criteria over the short to medium term (0-3 years). Assessments are based on the available information for the UoA and take into account any known management changes. Outlook scores are provided for information only and do not influence current or future risk scoring.

Table 1: Outlook scoring categories.

Outlook score	Guidance
Improving	The performance of the UoA is expected to improve against the relevant risk assessment criteria.
Stable	The performance of the UoA is expected to remain generally stable against the relevant risk assessment criteria.
Uncertain	The likely performance of the UoA against the relevant risk assessment criteria is uncertain.
Declining	The performance of the UoA is expected to decline against the relevant risk assessment criteria.

Information sources

Information to support scoring is obtained from publicly available sources, unless otherwise specified. Scores are assigned on the basis of the objective evidence available to the assessor. A brief justification is provided to accompany the score for each PI. Information sources may include information gathered from the internet, fishery management agencies, scientific organisations or other sources.

Assessment Results

COMPONENT 1: Target fish stocks

1A: Stock Status

CRITERIA: (i)The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing.

(a) Stock Status

Eastern King Prawn **LOW RISK**

Eastern King Prawn (*Melicertus plebejus*) is endemic to Australia. Eastern King Prawn occurs on the Eastern Australian coast between Hayman Island in Queensland and north-Eastern Tasmania (20–42°S respectively). Eastern King Prawns are harvested in Queensland and New South Wales fisheries, and are considered a single multi-jurisdictional biological stock (Prosser and Taylor, 2016). This assessment examines the status of the Eastern Australian biological stock.

Prosser and Taylor (2016; and references therein) report that the most recent assessment estimates that biomass in 2010 was 60–80 per cent of the unfished 1958 levels. The assessment developed minimum monthly catch rate reference points that imply levels of biomass would be sufficient to sustain catches of MSY in each fishery region. For the Queensland component of the stock, standardised monthly regional catch rates were mostly above MSY catch rate reference points between 2009 and 2015, indicating the level of biomass was sufficient to sustain catches at MSY. For the New South Wales component of the stock, the median nominal commercial catch rates were relatively stable between 2012 and 2015, and slightly greater than catch rates prior to 2012. Fishery-independent surveys of recruit abundance show variable recruitment to the fishery with no discernible trend over 10 years. Indices of recruit abundance display peaks in 2008 and 2012. Based on the above, Prosser and Taylor (2016) conclude that the stock is unlikely to be recruitment overfished.

Given the very high estimated ratio of current to unfished biomass, there is evidence the stock is highly likely to be above the point of recruitment impairment (PRI) and probably fluctuating at or around levels capable of producing MSY.

Moreton Bay Bugs **MEDIUM RISK**

Reef Bug (*Thenus australiensis*) and Mud Bug (*T. parindicus*) are known collectively as 'Moreton Bay Bugs'. Moreton Bay Bugs are distributed along the tropical and subtropical coast of Australia from northern New South Wales to Shark Bay in Western Australia (Zeller et al, 2016). No studies have been carried out on the biological stock structure of Australian Moreton Bay Bugs. The two species have overlapping distributions; may be trawled together; are undifferentiated in the catch; and are assessed together.

Given the uncertainty in biological stock structure, this assessment examines stock status at the management unit level (Queensland). Both species of Moreton Bay Bugs are assessed as a single 'stock complex' (MSC, 2014).

Zeller at el (2016) report that while no formal stock assessment has been conducted, the 2009 ecological risk assessment reported a low risk of the species being recruitment overfished in the Great Barrier Reef Marine Park (GBRMP), where harvesting pressure is greatest and which produces 90 per cent of the Qld ECOTF Moreton Bay Bug catch. A risk assessment for the Qld ECOTF reported an intermediate risk of recruitment overfished exists south of the GBRMP, where about 10 per cent of the Moreton Bay Bugs catch is taken. Since 2009, average nominal fishing effort has declined by 15 per cent in the GBRMP and by two per cent in the Qld ECOTF south of the GBRMP, indicating that the risk of the stock being recruitment overfished has not increased. Despite decreasing effort, catch and nominal catch rate has been increasing since 2011 and is near the historically high level of 2013. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

While the available evidence suggests it is probably highly likely the stock is above the point of recruitment impairment (PRI), there is no evidence to indicate the stock is at or fluctuating around a level consistent with MSY. Accordingly, the second condition of the low risk scoring guidepost is not met and we have scored this stock medium risk.

Balmain Bugs **MEDIUM RISK**

The common name 'Balmain Bug' refers to four similar species of fan lobster: *Ibacus alticrenatus*, *I. brucei*, *I. chacei* and *I. peroni* (Stewart and Zeller, 2016). These species partially overlap in their distributions on the east coast of Australia and have evolved different life-history strategies, tending to occupy different depth ranges. However, here, they are assessed as a single species group because they are rarely distinguished by fishers or fish marketers.

Given the prevailing influence of the East Australian Current along the east coast out to 150 m depth, a protracted pelagic larval phase and a northerly migration of older stages, true Balmain Bugs, Smooth Bugs and Honey Bugs are thought to each constitute single biological stocks across Queensland and New South Wales (Stewart and Zeller, 2016). Stock status of the Balmain Bugs species group in these jurisdictions is therefore presented at the biological stock level—East Coast biological stock.

Catch in the Queensland portion of the fishery comprises almost exclusively Smooth Bugs (*I. chacei*) (Stewart, 2015).

Stewart and Zeller (2016) report that:

- "*in New South Wales, Balmain Bugs (primarily true Balmain Bugs and Smooth Bugs) are trawl target species and have been assessed in terms of their commercial nominal catch rates and length compositions in landings. Median catch rates (kg per day in the ocean prawn trawl fishery) have fluctuated throughout the past 20 years but have shown no overall trends. The size compositions in landings have remained stable for both species. The above evidence indicates that the biomass of this part of the stock is unlikely to be recruitment overfished*";

- *"in Queensland, fishers harvest Balmain Bugs as a byproduct of Eastern King Prawn fishing. Logbook data indicates that Balmain Bugs contribute only a very minor component of the Eastern King Prawn fishers' catch and landed value. Balmain Bugs fishing mortality is managed by a prohibition on landing of egg-bearing females; conservative minimum legal sizes (MLS), which were updated in 2009; and mandatory use of turtle excluder devices since the early 2000s, which have been shown to lower the incidental catch rates of scyllarid lobsters, including Balmain Bugs. In addition, the spawning stock is partly protected from fishing during an annual seasonal closure. Landings have declined over the past decade from an average of 93 t per year in 2006–10 to 79 t per year in 2011–15. While nominal catch rates have declined since 2011 and the 2015 catch was relatively low (66 t), this is considered to be a result of the increased MLS for I. chacei and fisher behaviour, and not declining abundance.*

  A recent risk assessment of the Queensland East Coast Otter Trawl Fishery found a low risk of recruitment overfishing on the Queensland part of the East Coast Balmain Bug stock at the 2009 effort level south of the Great Barrier Reef Marine Park, where about 83 per cent of the catch is taken. Fishing effort targeting Eastern King Prawn in Queensland has declined by eight per cent since 2009, further reducing the risk of overfishing. The risk of recruitment overfishing within the Great Barrier Reef Marine Park (GBRMP) was assessed to be intermediate to high. However, fishing effort in the GBRMP has declined by 24 per cent since 2009, further reducing risk for this part of the stock.

  The above evidence indicates that the biomass of the Queensland part of the stock is unlikely to be recruitment overfished…"

While the available evidence suggests it is likely the stock is above the point of recruitment impairment (PRI), there is no evidence to indicate the stock is at or fluctuating around a level consistent with MSY. Accordingly, we have scored this stock medium risk.

PI SCORE	**LOW RISK – Eastern King Prawn**
	MEDIUM RISK – Moreton Bay Bug, Balmain Bug

1B: Harvest Strategy

CRITERIA: (i) There is a robust and precautionary harvest strategy in place.

(a) Harvest Strategy

The main elements of the harvest strategy for the QECOTF include:

- Limited entry through a requirement to hold a Commercial Fishing Boat License (FBL), as well as limited entry into the various sub-components of the fishery through the allocation of fishery symbols (T1, T2, M1 and M2);
- Limits on the Total Allowable Effort (TAE) in the ECOTF, allocated to each license holder as tradable 'effort units'. The combination of effort units held and the size of the vessel determine the number of fishing days each operator can work (larger vessels require more effort units to fish one day than small vessels). M2 vessels are restricted to Moreton Bay only and are not subject to effort units;
- Gear and mesh restrictions;
- Vessel hull size restrictions;
- Spatial and temporal closures, including the closures associated with the Great Barrier Reef Marine Park Zoning Plan;
- Vessel horse power restrictions;
- Daily catch and effort reporting;
- Monitoring effort usage through VMS;
- Periodic assessment of stock status for key species.

Although the ECOTF is currently effort limited with a cap on effort of 5% less than 1996 levels, the main weakness in the harvest strategy is the existence of substantial latent effort, despite licence buybacks in 2001 and 2005. In 2016, there were a total of 2.75 million effort units for the East Coast and 73,387 effort units for T2 (Concessional) licenses of which 64% EU and 27% respectively, were utilised (DAF, 2017a). At present, there are few mechanisms to prevent or manage effort shifts within the fishery (either geographically or across different target species) and overall effort in each sector is influenced more by economics that any effective catch constraint. There are no well-defined harvest control rules for any of the main target species.

The Queensland Government has recently announced the *Queensland Sustainable Fisheries Strategy 2017-2027* which commits amongst other things to improved monitoring and research and the adoption of harvest strategies for all major fisheries by the end of 2020, with a priority to develop trawl, crab and inshore fisheries strategies by the end of 2018 (DAF, 2017b). Harvest strategies will include well-defined harvest control rules and aim to maintain stocks at levels above MSY.

Eastern King Prawn **PRECAUTIONARY HIGH RISK**

Despite the broad distribution of EKP, all sources of mortality are well understood and relevant estimates of catch are available for all sectors. Catch is split approximately 80:20 between Queensland (where the main adult habitats are) and NSW (where the major recruitment grounds are) (O'Neill *et al.,* 2014).

In NSW, catches are primarily taken in the Offshore Trawl Fishery (OTF). The main measures in the harvest strategy include:

- Limited licences (and effort quota coming in 2018);
- Gear and mesh restrictions;
- Spatial zoning;
- Spatial and temporal closures;
- Daily catch and effort reporting;
- A Fishery Management System (FMS) that requires a recovery strategy to be implemented if the fishery status is assessed as

'overfished' or 'recruitment overfished';
- Periodic assessments of stock status.

O'Neill *et al.* (2014) developed a spatially structured model covering six separate regions of the fishery across Queensland and NSW, and estimated MSY at 3100t (95% c.i. 2454–3612 t). The 2015 catch was 2892 t (2363 t in Queensland; 529 t in New South Wales), which is below the estimate of MSY. The average catch in 2013–15 was 3135 t, which is slightly above the estimate of MSY.

Prosser and Taylor (2016) report that the most recent assessment estimates future effort (E) at MSY (E_{MSY}), standardised to the number of boat-days in 2010, as 38,002 boat-days (95% c.i. 27,035–50,754 boat-days) assuming no further increase in fishing power or costs. An alternative estimate of 28,300 boat-days (95% c.i. 20,110–37,663 boat-days) accounts for a three per cent per year increase in fishing power over the next decade and costs from 2010 levels. Effort in 2015 was 20,076 boat-days (14,688 boat-days in Queensland; 5388 boat-days in New South Wales), which was well below both estimates of E_{MSY} and the peak effort of around 30,000 boat-days in 2000, but similar to levels in 2013. The decline in effort since 2000 has been offset by increases in fishing power. The number of boats accessing the Eastern King Prawn sector of the QECOTF has remained stable since 2013, but has continued to decline in New South Wales.

Unlike many other species targeted in the ECOTF, the proportion of the stock protected by closures in the GBRMP is very low and the level of protection afforded by other closures (e.g. State marine parks, closures under the Fisheries Act) is unknown. An effort cap for the Southern Trawl Fishery area is in place which, if exceeded, limits each license to no more than 24 trawl fishing days per month for the months May, June and July. The intent of the closure is to maintain effort at levels consistent with E_{MSY} estimated by Courtney et al (2014a). Nevertheless, the extent to which this measure can effectively limit overall effort is unclear because (a) days are likely to be lost each month through bad weather anyway and (b) there is nothing to prevent latent or active licences entering the fishery in years when the rule is triggered.

Accordingly, while the EKP stock is currently being fished at levels consistent with maintaining the stock at or above B_{MSY}, this appears to be largely due to economic constraints rather than harvest controls which actively limit exploitation to sustainable levels. Considerable capacity for additional fishing mortality exists within the fishery and it is not clear that existing harvest strategy arrangements are sufficient to achieve the stock management objectives in criterion 1A(i) if economic circumstances change. The EKP stock does not appear to have the same 'safety nets' afforded by spatial closures as some other stocks. Accordingly, this SI has been scored precautionary high risk.

Moreton Bay Bugs — LOW RISK

The ECOTF is the primary source of fishing mortality for Moreton Bay Bugs in Queensland. Permanent closures in the GBRMP protect significant portions of the biomass in Eastern Queensland, with research estimating that closures included 54% of the estimated biomass of Reef Bug and 45% of the estimated biomass of Mud Bug in 2005 within the GBRMP region, which accounts for 90% of the fishery harvest (Pitcher *et al.* 2007). Bugs are a longer-lived species than other ECOTF target species with limited movements (Jones 1988; Courtney 1997) and thus permanent closures are more likely to provide effective protection against overfishing.

Zeller et al (2016) also note that the minimum legal size limit of 75 mm carapace width (CW) allows Mud Bug the opportunity to spawn before entering the fishery. Individuals below this size are discarded from the retained catch. Post-capture survival is high among Moreton Bay Bugs (Hill et al, 1998). Research has also shown that turtle excluder devices (TEDs) lower catch rates of legal sized Moreton Bay Bugs (greater than 75 mm CW) and 100 mm square-mesh codend bycatch reduction devices (BRDs) greatly lower incidental capture of undersize reef bug in the ECOTF management unit (Courtney et al, 2008) where about one-third of vessels use square-mesh codends. Retention of berried female bugs since 2010 is likely a factor in maintaining generally higher catches. However, Zeller et al (2016) conclude that the risk of overfishing is unlikely to be increasing under the current scenario of significant biomass protection within permanent GBRMP closures, size selectivity of TEDs and BRDs and a likely decline in fishing related mortality associated with declining fishing effort.

Although the fisheries management arrangements do not appear particularly responsive to the state of the stock and suffer the same issues of latent capacity as other ECOTF stocks, protecting at least 40% of the biomass of both of these species in permanent closures provides an alternate means of achieving with high likelihood the stock management objectives reflected in criterion 1A(i).

Balmain Bugs — MEDIUM RISK

In 2015, approximately 77% of the total east coast catch of Balmain Bugs of 85t was taken in the Queensland ECOTF where they are primarily taken as a byproduct while targeting Eastern King Prawns. The remaining 23% was taken in the NSW OTF, where they may be targeted.

In the ECOTF, Balmain Bug fishing mortality is managed by a prohibition on landing of egg-bearing females; conservative minimum legal sizes (MLS), which were updated in 2009; and mandatory use of turtle excluder devices since the early 2000s, which have been shown to lower the incidental catch rates of scyllarid lobsters, including Balmain Bugs (Stewart and Zeller, 2016). In addition, the spawning stock is partly protected from fishing during an annual seasonal closure. Landings have declined over the past decade from an average of 93 t per year in 2006–10 to 79 t per year in 2011–15. While nominal catch rates have declined since 2011 and the 2015 catch was relatively low (66 t), Stewart and Zeller (2016) considered this to be a result of the increased MLS for *I. chacei* and fisher behaviour, and not declining abundance.

In the OTF, measures to limit harvest of Balmain Bugs are the same as those described for Eastern King Prawns. Landings have declined slowly over the past decade, from an average of 36 tonnes (t) per year in 2006–10 to 28 t per year in 2011–15. Current landings are at historically low levels (19 t in 2015) as a result of a large reduction in fishing effort, with the number of days fished ocean prawn trawling in 2015 being less than 30 per cent of those fished in 2000.

Stewart and Zeller (2016) reported that "a recent risk assessment of the Queensland East Coast Otter Trawl Fishery found a low risk of recruitment overfishing on the Queensland part of the East Coast Balmain Bug stock at the 2009 effort level south of the Great Barrier Reef Marine Park, where about 83 per cent of the catch is taken. Fishing effort targeting Eastern King Prawn in Queensland has declined by eight per cent since 2009, further reducing the risk of overfishing. The risk of recruitment overfishing within the Great Barrier Reef Marine Park (GBRMP) was assessed to be intermediate to high. However, fishing effort in the GBRMP has declined by

24 per cent since 2009, further reducing risk for this part of the stock." Based on the above, they concluded that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

At present, there are no well-defined harvest control rules for Balmain Bugs, and no recognised index of abundance. Catch and nominal catch rates are used to assess stock health, both of which may not be reliable indices of abundance (e.g. Harley et al, 2001). Fishing mortality is largely driven by levels of effort in the Eastern King Prawn sector and there is likely to be limited protection through spatial closures.

Nevertheless, the MLS applied to Balmain Bugs in both jurisdictions is likely to provide sufficient protection to achieve the stock management objectives reflected in criteria 1A(i). Both main species harvested, Eastern Balmain Bugs and Smooth Bugs, reach sexual maturity around 5cm carapace length (Stewart, 2015). Queensland applies a MLS of 10.5cm carapace width to smooth bugs (and also prohibits the take of egg-bearing females); NSW applies a MLS of 10cm to both Eastern Balmain and smooth bugs, based on their average size of female maturity (Stewart, 2015).

Stable size composition of the NSW catch provides some evidence that the current arrangements have served to avoid recruitment overfishing (Stewart, 2015).

Accordingly, we have scored this SI medium risk.

(b) Shark-finning

NA

CRITERIA: (ii) There are well defined and effective harvest control rules (HCRs) and tools in place.

(a) HCR Design and application

All stocks **PRECAUTIONARY HIGH RISK**

There are currently no well-defined harvest control rules for any of the ECOTF stocks which set out pre-agreed measures to limit exploitation as PRI is approached. Accordingly, none of the stocks can score low risk.

The best approximation of a HCR in the fishery was the Performance Measurement System (PMS) which established trigger points, which if breached, triggered a review of available data and management arrangements if required (QG, 2009). Nevertheless, use of the PMS has been largely discontinued, with the most recent report available from 2012 (DEEDI, 2012). There is also evidence from other key target stocks within the ECOTF that existing arrangements have not served to reduce exploitation as PRI is approached (e.g. saucer scallops; Kangas and Zeller, 2016). Accordingly, it not clear that generally understood HCRs are in place that are expected to reduce exploitation as PRI is approached.

Notwithstanding that, stock monitoring in recent years has detected no evidence of recruitment overfishing for any stock assessed here and effort levels across virtually all sectors are at very low levels historically. Accordingly, we have scored this SI precautionary high risk. The Queensland Government has recently committed to the development of a harvest strategy with well-defined HCRs for the ECOTF by the end of 2018 (DAF, 2017b).

PI SCORE	PRECAUTIONARY HIGH RISK – Eastern King Prawn, Moreton Bay Bug, Balmain Bug

1C: Information and Assessment

CRITERIA: (i) Relevant information is collected to support the harvest strategy.

(a) Range of information

Eastern King Prawn **LOW RISK**

Stock structure for EKP is well understood including areas of recruitment, distribution and movement in both New South Wales and Queensland. The biology of this species is also well understood (e.g. Courtney *et al.* 1995; Courtney *et al.* 1996; Lloyd-Jones *et al.* 2012). There are extensive catch and effort records from various fisheries in both states, and these have been used to develop a bio-economic model that provides appropriate measures such as effort at MSY and effort at MEY, to support the harvest strategy and potential harvest control rules (Courtney et al, 2014a; O'Neill et al, 2014). Also, fleet dynamics for the fishery are understood (including VMS data), with estimates of vessel power previously published (O'Neill and Leigh 2007).

Moreton Bay Bugs **MEDIUM RISK**

Moreton Bay Bugs are distributed along the tropical and subtropical coast of Australia from northern New South Wales to Shark Bay in Western Australia. No studies have been carried out on the biological stock structure of Australian Moreton Bay Bugs. The two species (*Thenus australiensis* and *T. parindicus*) have overlapping distributions, may be trawled together, are undifferentiated in the catch and are thus assessed together.

While the biological understanding of these two species in Queensland is incomplete, there is some information to inform the harvest strategy. For example, Pitcher et al (2007) provided estimates of the proportion of the biomass of each species in the GBRMP protected within no-take areas (54% for Reef Bug; 45% Mud Bug in 2005). Moreover, Courtney (1997) provided yield optimisation models that estimated growth, mortality and reproductive potential to provide advice on appropriate size limits. There are a number of other studies that have been conducted in NSW and Queensland that augment knowledge of these and closely linked species (Rowling et al. 2010, Stewart et al, 1997).

Fleet composition is well understood and additional data are collected to support the harvest strategy including vessel details, VMS

data, trawl effort (hours and distribution), and vessel power of the fleet (e.g. Braccini et al, 2012).

Balmain Bugs **LOW RISK**

The harvest strategy for Balmain Bugs is primarily based on the application of a conservative MLS which allows a sufficient proportion of females to breed prior to entry into the fishery. The reproductive biology of both main species, Eastern Balmain Bugs and smooth bugs, is sufficiently well-known to establish and evidence-based MLS (Stewart et al, 1997; Haddy et al, 2005; 2007). Although biological understanding of the deeper water species (*I. brucei, I. alticrenatus*) is incomplete, sufficient information is available in on the distribution and stock structure of the two main species to support the harvest strategy (e.g. Haddy et al, 2007).

Fleet composition is well understood and sufficient data are collected to support the harvest strategy including vessel details, VMS data, trawl effort (hours and distribution), and vessel power of the fleet.

(b) Monitoring and comprehensiveness

Eastern King Prawn **LOW RISK**

In the EKP sector, removals from the stock by commercial fisheries are monitored through compulsory catch and effort logbooks, while recreational catches are periodically estimated (e.g. West et al, 2015). Fisheries Queensland has routinely monitored stocks using an annual Fishery Independent Trawl (FIT) survey since 2006[1]. The FIT survey is conducted in key juvenile EKP habitats in southern Queensland waters during the peak recruitment period for the species (November and December). The index of abundance of recruit EKP produced by the survey is combined with other available fishery data to assess the status of the stock annually. These survey results, combined with standardised commercial catch rates and periodic stock assessments (e.g. O'Neill et al, 2014), are sufficient to support an effective HCR.

Moreton Bay Bug **MEDIUM RISK**

Removals from the Moreton Bay Bug stock are exclusively by the commercial sector and monitored through compulsory catch and effort logbooks. The main indices of abundance appear to be catch and nominal catch rate which are not always reliable measures of abundance (e.g. Harley et al, 2001). Although a formal HCR does not exist for the Moreton Bay Bug stock, the harvest strategy is largely based on protecting a sufficient proportion of the breeding stock through spatial closures and the application of an MLS. Good estimates of abundance within closed areas were developed in the mid-2000s (Pitcher et al, 2007), although the extent to which these estimates will remain over the longer term is not known. Given stock removals and at least one indicator is monitored we have scored the stock medium risk, however the stock would be better placed with a more reliable index of abundance linked to well-defined HCR.

Balmain Bug **MEDIUM RISK**

Removals from the Balmain Bug stock are exclusively by the commercial sector and monitored through compulsory catch and effort logbooks. In the ECOTF, the main indices of abundance appear to be catch and nominal catch rate which are not always a reliable (e.g. Harley et al, 2001). In the OTF, stock health is monitored through nominal catch rate as well as commercial size composition (Stewart and Zeller, 2016). Given stock removals and at least one indicator is monitored we have scored the stock medium risk. Indicators are not monitored consistent with a formal HCR.

CRITERIA: (ii) There is an adequate assessment of the stock status.

(a) Stock assessment

Eastern King Prawn **LOW RISK**

O'Neill et al. (2014) provide a comprehensive bioeconomic model for EKP that simultaneously assesses six different regions across Queensland and NSW and provided several different management strategy evaluations. The model estimates biomass relative to the reference year 1958 when data and catch history were first available, and produced estimates of MSY and effort at both MSY and Maximum Economic Yield (MEY). The model is appropriate for the stock and estimates status relative to reference points which are appropriate and can be estimated.

Moreton Bay Bugs **MEDIUM RISK**

No formal quantitative stock assessment has been conducted for Moreton Bay Bugs. The stock is currently assessed periodically using a 'weight-of-evidence' approach based on available indicators including nominal commercial catch rates and levels of overall effort (e.g. Zeller et al, 2016). Considerable weight is also placed on estimates of biomass likely to be protected in spatial closures in the GBRMP in which around 90% of the catch is taken. Status is assessed relative to generic reference points by way of status categories (e.g. overfished, sustainable, transitional-recovering, etc). Accordingly, we have scored the stock medium risk. Nevertheless, the stock would be better positioned against this indicator with a more formal, quantitative assessment.

Balmain Bugs **MEDIUM RISK**

Arrangements for assessment of Balmain Bugs are similar to Moreton Bay Bugs. No formal assessment has been undertaken of the East coast Balmain Bug stock. The stock is currently assessed periodically using a 'weight-of-evidence' approach based on available indicators including nominal commercial catch rates, levels of overall effort and commercial size composition data from NSW (e.g. Stewart and Zeller, 2016). Status is assessed relative to generic reference points by way of status categories (e.g. overfished, sustainable, transitional-recovering, etc). Accordingly, we have scored the stock medium risk. Nevertheless, the stock would be better positioned against this indicator with a more formal, quantitative assessment.

[1] https://www.daf.qld.gov.au/fisheries/monitoring-our-fisheries/commercial-fisheries/species-specific-programs/monitoring-reporting/Eastern-king-prawn-update

(b) Uncertainty and Peer review

Eastern King Prawn **LOW RISK**

O'Neill et al (2014) accounted for uncertainty in parameters such as stock-recruitment steepness, natural mortality and annual recruitment variation through Markov Chain Monte Carlo sampling, as well as running alternative model runs accounting for different estimates of fishing power. The methodology used and outcomes were published in a peer-reviewed journal.

Moreton Bay Bugs, Balmain Bugs **MEDIUM RISK**

The 'weight-of-evidence' approach used for the bug stocks relies on the qualitative judgement of scientists familiar with the stock to account for uncertainty, but there is no quantitative accounting for uncertainty. Assessment outcomes published through the Status of Key Australian Fish Stocks website are peer-reviewed.

PI SCORE	**LOW RISK – Eastern King Prawn**
	MEDIUM RISK – Moreton Bay Bug, Balmain Bug

COMPONENT 2: Environmental impact of fishing

2A: Other Species

CRITERIA: (i) The UoA aims to maintain other species above the point where recruitment would be impaired (PRI) and does not hinder recovery of other species if they are below the PRI.

(a) Main other species stock status

The intent of this scoring issue is to examine the impact of the UoA on 'main' other species taken while harvesting the target species. 'Main' is defined as any species which comprises >5% of the total catch (retained species + discards) by weight in the UoA, or >2% if it is a 'less resilient' species. The aim is to maintain other species above the point where recruitment would be impaired and ensure that, for species below PRI, there are effective measures in place to ensure the UoA does not hinder recovery and rebuilding.

The ECOTF is a large and complex fishery, encompassing multiple sub-sectors, across multiple bioregions and using slightly different gears and configurations of TEDs and BRDs in each sub-sector. As a result, the composition of other species taken in the fishery varies both spatially and temporally (e.g. Courtney *et al*., 2007). Previous studies have shown that the fishery interacts with a very large number of species, most of which occur only very infrequently in trawls (e.g. Poiner *et al.*, 1999; Courtney *et al.*, 2007). We are aware of no recent comprehensive assessments estimating catch composition by weight for each of the sub-sectors encompassing the target species assessed here. Accordingly, it is difficult to determine which species may qualify as 'main' other species (>5% of the catch by weight; >2% of the catch for 'less resilient' species). For the Eastern King Prawn fishery there are some data available from fishery-independent research trawls (Courtney *et al.* 2007). For all other fisheries, a comprehensive study of the effects of fishing in the Great Barrier Reef Marine Park provides some information to assess the likely status of other species in that region (Pitcher *et al.* 2007).

Eastern King Prawn **MEDIUM RISK**

The Eastern King Prawn fishery can be separated into two regions by depth; the shallow water and deep-water fisheries. The assemblage of other species differs substantially between these regions (Courtney *et al.* 2007).

There are no published data on the composition of the commercial catch (to a species level) from either the inshore or the offshore fishery. However, data are available from two fishery-independent trawl studies (Courtney *et al.* 2007) where mean catch rate per area trawled was determined for all living organisms in the catch (i.e. including corals and sponges) for each fishery. In the shallow water fishery, a total of 250 taxa were recorded in the 120 bycatch sub-samples, with most species being relatively uncommon. For example, 178 taxa (71% of species) occurred in fewer than 10% of sub-samples and 68 taxa (27% of species) were found in only one sub-sample. Four species comprised >5% of the catch by weight: the gurnard *Lepidotrigla argus,* the lizardfish *Saurida grandisquamis,* the flathead *Platycephalus longispinis* and Stout Whiting *(Sillago robusta)* (albeit bycatch of this species was reduced by more than 50% when nets were fitted with a radial escape section BRD and TED together).

In the deepwater fishery, overall volumes of bycatch were substantially lower than the shallow water fishery using a standard net (1.19kg/ha compared to 11.06kg/ha). When the square mesh codend BRD and TED were used together the bycatch catch rate fell significantly by 29%. A total of 227 taxa were recorded; seven taxa made up 50% of the bycatch weight and 40 taxa made up 90%. Four species comprised >5% of the total catch by weight: three-spined cardinal fish (*Apogonops anomalus*; 13.5%), orange-freckled flathead (*Ratabulus diversidens*; 10.4%), the gurnard (*Lepidotrigla argus*; 8.5%) and the orangemouth lizardfish (*Saurida filamentosa*, 5.7%).

It was noted by the authors that the locations of the study were determined from effort data of the fishery, however the catch rates of the target species (Eastern King Prawn), were likely to be lower than normal commercial fishing operations because when fishers found higher densities of prawns they would tend to trawl over these same grounds. This means that any measures of % catch for other species examined here are likely to be conservative (i.e. % of other species are likely to be higher here than during commercial trawling).

Of the species in each sector comprising >5% of the catch, only Stout Whiting has had a quantitative assessment undertaken. Roy and Hall (2016) report that population modelling conducted in 2014 indicated that biomass was marginally above the biomass that would

produce MSY. Accordingly, the species is highly likely to be above PRI.

The remaining species were assessed using Productivity-Susceptibility Analysis (PSA) consistent with the MSC's Risk Based Framework (Annex 1). Each species was scored low or medium risk. Accordingly, we have scored this SI medium risk overall. Nevertheless, we note that an ecological risk assessment (ERA) of trawling in the ECOTF south of the GBRMP has recently been completed and is currently in review. The outcomes of this assessment may be able to better inform scoring against this indicator when released.

Moreton Bay Bugs MEDIUM RISK

Moreton Bay Bugs are harvested throughout the ECOTF, although catch and effort is highest in the waters of the GBRMP which accounts for 90% of the catch (Zeller et al, 2016). Although no specific breakdown of catch composition in all trawls harvesting Moreton Bay Bugs is available, Pitcher *et al.* (2007) determined the risk from trawling to all species groups and to vulnerable individual species in the GBRMP, based on a quantitative assessment of the overlap of trawl effort with species distribution and biomass in the GBRMP. The authors modelled the likely distribution and biomass of species groups within the GBRMP, and then overlayed trawl swept area obtained from VMS data. By applying this at fine spatial scales they were able to determine the level of biomass exposed to trawling for various species groups. The next step then involved examining individual species within the species groups that were most at risk from trawling.

They took two approaches to assess risk to bycatch species; a Susceptibility-Recovery Analysis (SRA, following Stobutski *et al.* 2001 as cited in Pitcher *et al. 2007*); and an analysis of a catch and mortality that was analogous to the SAFE assessment of Zhou and Griffiths (2007) (Pitcher *et al.* 2007). The former approach was only a ranking exercise, while the latter approach was a quantitative measure with a Limit Reference Point. Three species exceeded the Limit Reference Point and one of them, the Tufted Sole, *Brachirus muelleri*, was also the highest ranked species of the SRA. The other two species were the Rough Flutemouth, *Fistularia petimba*, and the Blacktip Tripodfish, *Trixiphichthys weberi*.

While this study provides a sound empirical analysis of sustainability risk, it does not provide a direct measure to assess the status of the main other species in relation to PRI. To do this, it is useful to examine the context of the trawl fishery effort within the GBRMP. Of the 200,000 square kilometres included in the study area, more than 65% of the available area was protected from trawling by closed areas. Of the high risk species, only 69% of the Tufted Sole biomass was available to trawling. In other words, 31% of the biomass was protected from trawling in 2005. For the other two species, 56% and 44% of their biomasses, respectively, were protected by closed areas. Assuming that the 2005 effort distribution was representative of most years, and given that trawl effort in the GBRMP has since reduced substantially (e.g. DAF, 2017c), this level of biomass protection within closed areas is probably sufficient to ensure that for the most at-risk species the UoAs are at least unlikely to reduce their populations to the point of recruitment impairment. In addition, legislated by-catch reduction devices further reduce the likelihood of capture (Courtney *et al.* 2007; DAF, 2017c). TEDs substantially reduce the capture of large fish, sharks and rays, while fish-eye devices and square mesh cod-ends that are used in most regions of the GBRMP significantly reduce the likelihood of capture of smaller species (Courtney *et al.* 2007). It is also likely that a sizeable proportion of the area open to trawling may remain untrawled in any one year.

On the basis of the above, the available evidence suggests that measures currently in place in the fishery, most notably substantial permanent closures in the GBRMP area (under both Commonwealth and State legislation) and gear modifications such as BRDs and TEDs, are likely to offer sufficient protection from trawling that the fishery is unlikely to result in the most at risk species being depleted to the point of recruitment impairment. This is particularly the case given overall effort reductions in the fishery since 2005 when the Pitcher et al (2007) study was undertaken. Nevertheless, as with the target species assessments, there is substantial latent capacity in the fishery which, if activated, may influence the impact of each UoA on other species. Ongoing trends in effort in the context of previous risk assessments should be considered in future assessments.

Particular consideration should also be given to two other species/species groups that may be harvested in trawls together with Moreton Bay Bugs: saucer scallops and sharks/rays. For saucer scallops, the most recent quantitative assessment estimated that the spawning biomass of the East Coast biological stock in 2015 may be as low as five to six per cent of the unfished level (1977) (Kangas and Zeller, 2016) and the stock is considered recruitment overfished. A number of management measures were introduced in late 2016 to reduce fishing pressure, including permanently closure of all Scallop Replenishment Areas from 3 January 2017 and an annual six month prohibition on all east coast saucer scallop harvesting, effective 1 May 2017 (DAF, 2017c). Kangas and Zeller (2016) conclude that the current level of fishing pressure is expected to allow the stock to recover from its recruitment overfished state; however, measurable improvements in biomass are yet to be detected. Accordingly, the fishery has measures in place that are expected to ensure it does not hinder recovery and rebuilding, consistent with the medium risk scoring guidepost. The effective of the measures and extent of actual recovery should be assessed in future assessments.

For sharks and rays, Pears et al (2012) assessed several species to be at higher risk of overfishing in the ECOTF based on life history characteristics (e.g. slow growth and low fecundity) which make them more susceptible to fishing impacts. The fishery has a number of measures in place which serve to limit mortality on sharks and rays including a prohibition on retaining sharks and rays, TEDs, substantial spatial closures and limits on overall effort. DAF (2017c) report that research on ECOTF discards is currently underway and "by late 2017, it is envisaged that research stakeholders will have access to estimates of trawl fishing effort levels that ensure the long-term sustainability of sharks and rays species susceptible to capture in the ECOTF". Based on the above, we have scored this SI medium risk.

Balmain Bugs MEDIUM RISK

The composition of catches in ECOTF trawls in which Balmain Bugs are harvested are not publicly available, however the majority of Balmain Bug catches are taken as a byproduct in the deepwater Eastern King Prawn fishery (Stewart and Zeller, 2016). Accordingly, the outcomes of the Eastern King Prawn assessment above are probably a reasonable indicator of risk in trawls harvesting Balmain Bugs.

CRITERIA: (ii) There is a strategy in place that is designed to maintain or to not hinder rebuilding of other species.

(a) Management strategy in place MEDIUM RISK

There are a number of management measures that are largely common across each of the units of assessment which are designed to limit the impact of the ECOTF on non-target species. These include:

- **Spatial and temporal closures**: Considerable spatial and temporal closures exist within the area of the ECOTF, and in particular in the area of the GBRMP. Closures are enacted under Queensland fisheries legislation (for example, all areas in the GBRMP either untrawled or lightly trawled were closed to trawling in 1999 under the East Coast Trawl Plan, in addition to a large number of pre-existing closures for resource allocation of resource protection purposes), State marine parks legislation (e.g. Moreton Bay Marine Park and Great Sandy Strait Marine Park) and the GBRMP Zoning Plan. Pears *et al.* (2012) estimated that trawling is permanently excluded from 66.2% of the GBRMP and approximately 42% of the total fishery area;
- **Effort reduction and cap**: In the last two decades significant reductions in nominal effort have occurred for the fishery. Also an effort cap has been established to maintain the fishery at 5% less effort than 1996 levels;
- **Bycatch reduction devices**: The Trawl Plan requires the mandatory use of BRDs and TEDs of particular specifications. A rebate scheme has been offered by the Queensland Government to assist operators install square mesh cod ends and half round square mesh cod ends in their nets. These devices are particularly important to reduce the risk to sharks and rays that were identified as the highest risk category by Pears *et al.* (2012);
- **Size and trip limits** apply for several species; and
- Substantial **research** effort and risk assessments to understand and minimise the impacts of the fishery on non-target species (e.g. Poiner et al, 1999; Pitcher et al, 2007; Courtney et al, 2007; Pears et al, 2012).

Although many of the spatial closures within the fishery area were not established specifically for fisheries management, clearly they play an important role in reducing the impact of the fishery on populations of other species in the region. Considerable research effort has been undertaken to develop bycatch reduction technologies that have proven to substantially reduce the risks to other species as well (e.g. Courtney *et al.* 2007; Courtney *et al.* 2010). Importantly, the agency has acted to ensure implementation through legislation. Collectively these measures could be expected to maintain other species at levels which are likely to be above the PRI. Nevertheless, there are ongoing weaknesses in the collection of information (e.g. there is no ongoing independent verification of bycatch species composition and volume) which limit the capacity of the management agency to formulate and monitor the effectiveness of a strategy to limit the impacts of the UoAs on other species which mean the fisheries cannot score low risk. Accordingly, we have scored this SI medium risk.

(b) Management strategy evaluation

Eastern King Prawn, Balmain Bug — **MEDIUM RISK**

Research into the effectiveness of bycatch reduction devices (e.g. Courtney et al, 2007; 2008; 2014b) provides some objective basis for confidence that these measures will work while the Fisheries Queensland compliance program provides some basis for confidence that the measures are being implemented successfully. BRD related compliance from 2014-16 was generally high (DAF, 2017c).

In addition, substantial reductions in fishing effort over the past 10-15 years provide a plausible argument that overall impacts on bycatch are likely to be reducing. Nevertheless, there are fewer spatial closures in the area of the Eastern King Prawn fishery than many other sectors and only limited data on commercial catch composition by weight with no ongoing monitoring. To that end, there is no overall objective basis for confidence that the measures will work and are being implemented effectively.

Moreton Bay Bug — **LOW RISK**

Pitcher *et al.* (2007) provide evidence that the current closures protect a high proportion of the biomass of other species and, in combination with reduced effort in the GBRMP area, provides an objective basis for confidence that the partial strategy will work. The fleet has mandatory use of VMS which aids compliance to ensure that closures, and the effort cap, are being complied with. Bycatch reduction devices also play an important role in reducing impact on other species.

(c) Shark-finning

NA

CRITERIA: (iii) Information on the nature and amount of other species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage other species.

(a) Information — MEDIUM RISK

A substantial body of research work is available to assess the impacts of the ECOTF on non-target species including fishery-independent studies on shallow and deepwater EKP stocks (Courtney *et al.* 2007), quantitative studies on trawling in the GBRMP (Poiner et al, 1999; Pitcher *et al.* 2007) and a more recent qualitative risk assessment (Pears *et al.* 2012). Accordingly, while some quantitative data exist to assess the impact of the UoAs on other species, the main weakness is the absence of ongoing monitoring of non-target species composition and volume which limits the ability of the management agency to monitor the effectiveness of any strategy and to detect increased risk. Notwithstanding that, we note that a project is currently underway to estimate the composition and quantity of discards from the ECOTF during the period 1988 – 2014. This project should provide an empirical basis to examine the impact of effort reductions and management measures such as the introduction of TEDs and BRDs, reductions in fishing effort on other species[2].

PI SCORE	MEDIUM RISK – Eastern King Prawn, Moreton Bay Bug, Balmain Bug

[2] https://www.daf.qld.gov.au/services/news-and-updates/fisheries/news/research-underway-on-queenslands-east-coast-trawl-fishery

2B: Endangered Threatened and/or Protected (ETP) Species

CRITERIA: (i) The UoA meets national and international requirements for protection of ETP species.
The UoA does not hinder recovery of ETP species.

(a) Effects of the UoA on populations/stocks

MEDIUM RISK

The ECOTF interacts with a number of protected species including turtles, sea snakes, sawfish and sygnathids (e.g. Pears et al, 2012; DOE, 2013). The introduction of mandatory measures such as the use of turtle excluder devices and bycatch reduction devices in all trawl nets has significantly reduced the capture rate of most of these groups and the majority are released alive (DOE, 2013). Since the introduction of mandatory turtle excluder devices in the fishery, turtle and sawfish captures have been low with four turtles and one sawfish captured in 2012, all released alive (DOE, 2013).

In recent years, particular attention has been paid to the bycatch of sea snakes in the ECOTF. All species of sea snake are 'listed marine species' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and protected under the *Great Barrier Reef Marine Park Act 1975* and the Queensland *Nature Conservation Act 1992*. Based on sampling between 2005 and 2007, Courtney et al (2010) estimated 105,210 (s.e. 18,288) sea snakes, composed of 12 species, were caught in the fishery annually. Of these, around 26% were estimated to die as a result of capture. Mortalities were highest in the Redspot King Prawn fishery which accounted for 58.9% of all sea snake catches and 84.5% of all mortalities. In general, trawl fishing sectors south of about 20°S (i.e. the Eastern King Prawn, Stout Whiting, beam trawl, Moreton Bay, Banana Prawn and Saucer Scallop fisheries) imposed relatively little incidental mortality on sea snake populations, mainly because catch rates were low or survival rates were high. Based on the risk modelling approach of Pitcher et al (2007), Courtney et al (2010) estimated that the level of incidental fishing mortality for one species of sea snake, *Hydrophis elegans*, was marginally above that associated with maximum sustainable yield and therefore, that recruitment for *H. elegans* is being reduced by trawling. However, they also noted that this "should not be interpreted as a high risk of extinction from the Queensland east coast" and also that "in general, the risk of incidental mortality approaching levels that are associated with recruitment failure appears low for all species, while the risk of localised (i.e. with the GBRMP) extinction due to trawling is highly unlikely".

On 1 March 2015, fisheye and square mesh cod end (SMCE) BRDs were made mandatory for trawl nets fishing all ECOTF sectors except the saucer scallop sector "where SMCEs offer an optimum in terms of low sea snake bycatch and low catch of undersized Moreton Bay Bugs-the main scallop fishing byproduct species" (DAF, 2017c). Courtney et al (2010) estimated that the fisheye and SMCE BRDs reduced the catch rate of sea snakes by 63% and 60%, respectively.

DAF (2017c) report that "subsequent analysis of sea snake interactions based on the effort-weighted method of Courtney *et al*., (2010) indicate that management changes and reduction in effort in the ECOTF are likely to have progressively reduced sea snake interactions and related mortality since these were first quantified. Estimates indicate that the mean annual number of sea snakes captured in 2008-13 was 40% less than in 2003-07. At 47 118 sea snakes in 2014-15, it is estimated that 50% fewer sea snakes were captured than in 2003-07 (Figure 3). Importantly, the percentage decline in mean annual sea snake mortality has been even greater; the 2008-13 estimate is 50% less than in 2003-07, and at 5 330 sea snakes, mortality in 2014-15 was only 31% of the 2003-07 estimate (Figure 3).

Based on these estimates and the previous risks assessed by Courtney et al (2010), it appears the measures in place could be expected to ensure the ECOTF does not hinder recovery of sea snake species.

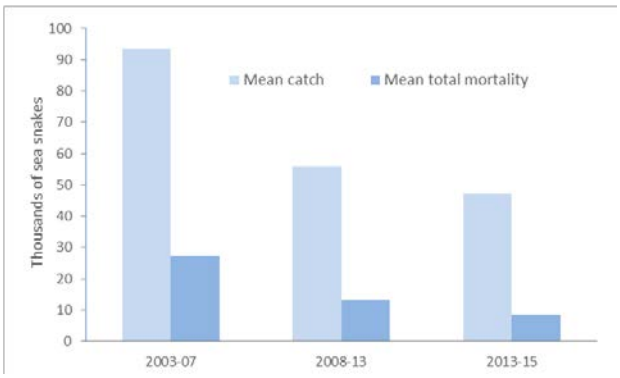

Figure 2: Trends in mean sea snake catch and mortality in the ECOTF from 2003-15. (Source: DAF, 2017c)

DOE (2013) also note that the fishery interacts with two species of seahorse, three species of pipefish and one species of pipehorse. Pears et al (2012) assessed each of these species to be at intermediate risk from trawling operations as bycatch reduction devices are ineffective at excluding these species and they have low post capture survival. However, large areas of the Great Barrier Reef Marine Park are closed to trawling (66% of the marine park) and there are trip limits placed on the harvest of these species.

Overall DOE (2013) concluded that "given the management measures in place in the fishery, including:

- limited entry
- tradable effort units
- gear restrictions (net and boat)
- mandatory bycatch reduction devices and turtle excluder devices
- spatial and temporal closures,

the Department considers that the current operation of the fishery is not likely to adversely affect the survival or recovery in nature of any listed threatened species."

While the available evidence indicates it is likely the current operation of the fishery is not hindering recovery of ETP species, the absence of ongoing independent data collection on interactions means this cannot be concluded with high certainty. Accordingly, we have scored this SI medium risk.

CRITERIA: (ii) The UoA has in place precautionary management strategies designed to:

- meet national and international requirements; and
- ensure the UoA does not hinder recovery of ETP species.

(a) Management strategy in place MEDIUM RISK

The measures in place to minimise the impact of the ECOTF on ETP species include:

- **Spatial closures** - trawling is permanently excluded from 66.2% of the GBRMP and approximately 42% of the total fishery area (Pears *et al.* 2012);
- **Bycatch reduction devices** - the Trawl Plan and subsequent amendments requires the mandatory use of BRDs and TEDs of particular specifications. TEDs are particularly important for turtle and sawshark exclusion (e.g. Courtney et al, 2007; Pears et al, 2012). From 1 March 2015, fisheye and SMCE BRDs were made mandatory for trawl nets fishing all ECOTF sectors for the purpose of sea snake bycatch reduction, except the saucer scallop sector. In the scallop sector, SMCEs offer an optimum in terms of low sea snake bycatch and low catch of undersized Moreton Bay Bugs-the main scallop fishing byproduct species (DAF, 2017c). Courtney et al (2010) estimated that the fisheye and SMCE BRDs reduced the catch rate of sea snakes by 63% and 60%, respectively.
- **Effort reduction and cap** - In the last two decades, significant reductions in nominal effort have occurred for the fishery, within an overall effort cap of 5% less effort than 1996 levels;
- A requirement for **live release** of ETP species;
- Monitoring of interactions through a mandatory, separate **SOCI logbook** which has been in place since 2002;
- Targeted **research** to quantify levels of interactions and the effectiveness of mitigations measures (e.g. Courtney et al, 2007, Courtney et al, 2010).

Accordingly, the ECOTF currently has a range of measures in place that are expected to ensure the fishery does not hinder recovery of ETP species. The main weakness at the moment is the absence of a mechanism to validate reporting in SOCI logbooks, which has been under-reported for some species historically (e.g. Courtney et al, 2010). DAF (2017c) report that a means of validating SOCI logbooks will be established as a priority as part of the recently announced *Queensland Sustainable Fisheries Strategy.*

(b) Management strategy implementation LOW RISK

Independent research on the effectiveness of mitigation measures (e.g. Courtney et al, 2007; 2010; Pitcher et al, 2007) provides some objective basis for confidence that the measures will work. In the case of sea turtles for example, Pears et al (2012) report that trawl catch rates (number of animals landed on deck) have declined over 100-fold from more than 5000 to two to three reported marine turtle landings annually. With appropriate handling and resuscitation methods, survival has also improved substantially, with no recorded mortality from trawling in the Great Barrier Reef Region in 2008 and 2009.

Compliance information provides evidence that the measures are being implemented successfully. For example, DAF (2017c) reports that BRD related compliance from 2014-16 was generally high (~95%).

CRITERIA: (iii) Relevant information is collected to support the management of UoA impacts on ETP species, including:

- information for the development of the management strategy;
- information to assess the effectiveness of the management strategy; and
- information to determine the outcome status of ETP species.

(a) Information MEDIUM RISK

Interactions with ETP species is primarily monitored through a mandatory SOCI logbook which has been in place since 2002, as well as through targeted research studies (e.g. Courtney et al, 2007; 2010; Pitcher et al, 2007). The effectiveness of TEDs for turtles, sharks and rays is well understood (e.g. Courtney *et al.* 2007), as is the population status of Australia's marine turtles (e.g. Limpus *et al.,* 2013). Moreover, research on sea snake interactions has been sufficient to assess risk from each sector, as well as support new regulations on the mandatory use of best practice BRDs through the ECOTF (Courtney et al, 2010). A comprehensive qualitative ERA has been undertaken on the impacts of the fishery, including on ETP species, in the GBRMP area (Pears et al, 2012), and a complementary ERA has recently been completed (albeit is not yet publicly available) for the area south of the GBRMP area (DAF, 2017c).

As discussed above, given the fishery has the capacity to interact with a number of ETP species the main weakness at present is the absence of measures to independently validate SOCI logbook reporting in order to monitor the effectiveness of mitigation measures. DAF (2017c) report that this will be addressed as a priority as part of the recently announced *Queensland Sustainable Fisheries Strategy.*

PI SCORE	MEDIUM RISK – Eastern King Prawn, Moreton Bay Bug, Balmain Bug

2C: Habitats

CRITERIA: (i) The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the

basis of the area(s) covered by the governance body(s) responsible for fisheries management

(a) Habitat status

Examples of "serious or irreversible harm" to habitats include the loss (extinction) of habitat types, depletion of key habitat forming species or associated species to the extent that they meet criteria for high risk of extinction, and significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the associated species assemblages (MSC, 2014). Further, MSC specifies that if a habitat extends beyond the area fished then the full range of the habitat should be considered when evaluating the effects of the fishery. The 'full range' of a habitat shall include areas that may be spatially disconnected from the area affected by the fishery and may include both pristine areas and areas affected by other fisheries.

It is recognized that when demersal trawl gear touches the bottom, damage may be done to the benthic environment and the communities that dwell there. Depending on the type of habitat, type of interaction, its duration and frequency; some areas may receive longer lasting damage while other areas will be able to recover in relatively short time periods. Damage to some habitats may occur with minimal trawling due to the nature of the benthic organisms and the depth (e.g. biogenic habitat with vertical relief). Damage will, however, be restricted to areas trawled so that, the extent of any damage will be in proportion to the trawl footprint of the fishery.

Eastern King Prawn/Balmain Bug MEDIUM RISK

There is little direct information on habitat status and interactions south of the GBRMP where EKP are targeted. However, there are substantial spatial closures associated with the Moreton Bay Marine Park (MBMP) and Great Sandy Strait Marine Park (GSSMP), as well as many inshore closures under the Trawl Plan. In the case of the MBMP, closures were designed to protect a representative sample of habitats within the park. In the northern extent of the UoA, closures within the GBRMP under the GBRMP Zoning Plan are designed to protect at least 20% of each bioregion in the marine park in no-take areas. While these measures in combination with more generic measures such as effort and gear limitations are probably sufficient to ensure that the UoA is unlikely to reduce structure and functions of habitats to the point where there would be serious or irreversible harm, there is insufficient information on the overlap of the fishery with habitats south of the GBRMP at this stage to justify a score of 'highly likely' (i.e. low risk). We note that a risk assessment of the ECOTF south of the GBRMP has recently been completed, albeit is not yet publicly available. Relevant outcomes of this assessment should be taken into account in future assessments when it becomes publicly available.

Moreton Bay Bugs LOW RISK

Around 90% of the Moreton Bay Bug harvest is taken within the waters of the GBRMP. Pears *et al.* (2012) estimated that trawling is permanently excluded from 66.2% of the GBRMP. The GBR Seabed Biodiversity project mapped nine habitat types (clusters) and assessed risks to each habitat cluster from trawling throughout the continental shelf of the GBR (Pitcher *et al.* 2007). The most relevant measure considered the distribution of trawl effort and identified that the nine habitat clusters varied in trawl exposure from 3 to 39%, with 39% considered a moderate level of risk.

Various scenarios of management change were also examined from the peak effort for the fishery in the late 1990s. It was determined that the reductions in trawl effort that occurred up until 2006 were sufficient that even the most vulnerable habitat types had demonstrated significant recovery. Effort has since further reduced in the GBRMP from 2006 levels (DAF, 2017c). These analyses are sufficient to demonstrate that the fishery in the GBR at current effort levels is highly unlikely to reduce the structure and function of habitats within the GBR system to the point where there would be serious or irreversible harm. Accordingly, we have scored this SI low risk.

CRITERIA: (ii) There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.

(a) Management strategy in place

There are a number of management measures to limit habitat impacts in the ECOTF. These include:

- **Spatial closures** - trawling is permanently excluded from 66.2% of the GBRMP and approximately 42% of the total fishery area (Pears *et al.* 2012). Closures protect sensitive, representative habitats within the GBRMP, MBMP and GSS MP.
- **Effort reduction and cap** - In the last two decades, significant reductions in nominal effort have occurred for the fishery, within an overall effort cap of 5% less effort than 1996 levels;
- **Gear restrictions**: The size and power of vessels and the gear that they trawl with are restricted through legislation. Of particular importance for habitats is the restriction on the weight of chains.
- **VMS**: all vessels are required to use VMS to ensure compliance with spatial and temporal closures, and to make it easy for compliance officers to know where vessels are when undertaking compliance activity
- Substantial **research** activity to evaluate and manage the impacts of the fishery on habitats, particularly within the GBRMP (e.g. Poiner et al, 1999; Pitcher et al, 2007).

Notwithstanding that, we note that significant latent capacity exists within the management system which, if activated, may influence the overall habitat impacts of the fishery. Any new information on trends in the overall level and spatial distribution of trawl effort in the context of habitats within the ECOTF should continue to be evaluated in future assessments.

Eastern King Prawns/Balmain Bugs MEDIUM RISK

While the northern part of the EKP fishery occurs in the GBRMP, much of the stock exists to the south of the GBRMP boundary where there are fewer spatial closures. While measures are in place which could be expected to ensure habitat structure and function is not reduced to the point of serious or irreversible harm (e.g. closures in the GBRMP, inshore spatial closures under the MBMP, GSSMP, Fisheries Act) there is insufficient evidence at this stage to conclude this was 'highly likely' (i.e. low risk). As above, we note that a risk assessment of the ECOTF south of the GBRMP has recently been completed, and relevant outcomes of this assessment should be

factored into future assessments when available.

Moreton Bay Bugs **LOW RISK**

In the waters of the GBRMP in which around 90% of the Moreton Bay Bug harvest is taken, the measures above form at least a partial strategy to achieve the outcomes stated in criterion 2C(i).

(b) Management strategy implementation

Eastern King Prawn/Balmain Bug **MEDIUM RISK**

Closed areas, effort caps and gear restrictions are all effective management tools that are proven effective in management of habitat impacts, when coupled with an appropriate compliance program. Representative closures under the MBMP and GSMP, closures to some bioregions in the northern part of the fishery in the GBRMP, together with effort reductions and the relatively concentrated spatial footprint of the fishery provide a plausible argument that the existing measures will work. However, the area south of the GBRMP has not yet been subject to the same degree of analysis as the part within the GBRMP and is subject to fewer spatial closures protecting representative habitats. Accordingly, there is less information to support an objective basis for confidence that the measures will work and we have scored this SI medium risk. We note that an ecological risk assessment for the QECOTF south of the GBRMP is currently in review and will likely provide additional information to support scoring against this SI.

Moreton Bay Bug **LOW RISK**

The Seabed Biodiversity Project (Pitcher *et al.* 2007) provides objective evidence that the strategy is working to minimise the risk to habitats in the GBRMP.

CRITERIA: (iii) Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.

(a) Information quality **LOW RISK**

The majority of the spatial area of the QECOTF occurs within the GBRMP. Despite ongoing information gaps, the GBRMP area is one of the most well-studied marine environments in the world. Pitcher et al (2007) comprehensively assessed the seabed biodiversity within the GBRMP, while habitat types were mapped in considerable detail to support the rezoning of the GBRMP in 2004 (e.g. Kerrigan et al, 2010). This mapping exercise was informed by decades of independent scientific research. The nature, distribution and vulnerability of the main habitat types south of the GBRMP are less studied, but are probably sufficiently well-known (e.g. DEWHA, 2007; Brewer et al, 2007; Keene et al, 2008) to formulate an effective strategy to ensure the ECOTF does not reduce habitat structure and function to the point of serious or irreversible harm.

(b) Information and monitoring adequacy **LOW RISK**

Detailed information is available on the main impacts of the UoAs on the main habitat types of the GBR (e.g. Poiner et al, 1999; Pitcher et al, 2007), and VMS information provides fine scale information on fishing effort sufficient to detect any increase in risk. For the EKP fishery, information from the GBRMP is adequate to allow for the identification of the main impacts of the UoA, as well monitor the spatial extent of interaction.

PI SCORE	**LOW RISK – Moreton Bay Bugs**
	MEDIUM RISK – Eastern King Prawn, Balmain Bugs

2D: Ecosystems

CRITERIA: (i) The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.

(a) Ecosystem Status **LOW RISK**

Serious or irreversible harm in the ecosystem context should be interpreted in relation to the capacity of the ecosystem to deliver ecosystem services (MSC, 2014). Examples include trophic cascades, severely truncated size composition of the ecological community, gross changes in species diversity of the ecological community, or changes in genetic diversity of species caused by selective fishing.

Pitcher *et al.* (2007) demonstrated that trawling impacts on habitats and their associated species assemblages were at sustainable levels, and were highly unlikely to be causing serious or irreversible effects to the ecosystem of the GBR. In addition, Pears et al (2012) assessed 14 ecosystem processes, all of which were considered to be at low risk from trawling.

While similar studies have not been conducted in the region south of the GBR where EKP are targeted, similar reductions in effort have been observed in this region since the late 1990s and therefore it is considered highly unlikely that the fishery is causing serious or irreversible harm to the ecosystem. Notably, there have been several quantitative studies on the impacts of trawl bycatch reduction devices in this region (Courtney *et al.* 2007) that provide additional confidence that these gear modifications further reduce the impact of trawling on individual species, species assemblages and ETPs.

CRITERIA: (ii) There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.

(a) Management Strategy in place	LOW RISK

The measures in place to manage ecosystem impacts are largely the same as those in place for target species, ETP species and habitats, namely gear and effort restrictions, large scale spatial closures, BRDs and TEDs, VMS and targeted research. Collectively these measures constitute at least a partial strategy which is expected to restrain impact of the UoA on the ecosystem so as to achieve the outcome stated in criterion 2D(i).

(b) Management Strategy implementation	LOW RISK

Pitcher *et al.* (2007) provides objective evidence that these measures are likely to work and indeed that they are being implemented successfully. While similar studies have not been conducted in the region south of the GBR where EKP are targeted, several studies on bycatch reduction devices that have since been implemented through legislation provide increased confidence that the impact of the fishery on other species and ETPs is minimised. Together these studies provide sufficient confidence and evidence that these measures are being implemented successfully.

CRITERIA: (iii) There is adequate knowledge of the impacts of the UoA on the ecosystem.

(a) Information quality	LOW RISK

Pitcher *et al.* (2007) provides an excellent basis for understanding the ecosystem and determining measures to assess changes in risk. Again, while the region south of the GBR where EKP are targeted has not been studied in this detail, additional information on the impact of bycatch reduction devices on ETP and individual species augments the work from the Seabed Biodiversity Project. Together this information is sufficient to assess changes in risk to the ecosystem.

(b) Investigations of UoA impacts	LOW RISK

The main impacts of the fishery on the main ecosystem elements can be inferred from existing information (e.g. Poiner et al, 1999; Pitcher *et al,* 2007) and some have been investigated in detail.

PI SCORE	LOW RISK

COMPONENT 3: Management system

3A: Governance and Policy

CRITERIA: (i) The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:

- Is capable of delivering sustainability in the UoA(s); and
- Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood.

(a) Compatibility of laws or standards with effective management	LOW RISK

The Queensland Government management and legislative framework is consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with Components 1 and 2.

(b) Respect for Rights	LOW RISK

The rights of customary fishers are recognised by the s14 exemption in the Fisheries Act that allows for an "Aborigine or Torres Strait Islander" to take fish for "the purpose of satisfying a personal, domestic or non-commercial communal need". Additional customary rights may be sought under Commonwealth Native Title legislation.

CRITERIA: (ii) The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.

(a) Roles and Responsibilities	LOW RISK

The roles and responsibilities of the main organisations and individuals involved in the management process are explicitly defined and well understood, despite the complexities associated with fisheries management in the GBRMP. FQ are responsible for day-to-day management of the QCRFF. GBRMPA are responsible for the broader management of the GBRMP, including spatial management decisions. Accountability relationships between the main agencies and their responsible Ministers are clear. Formal processes exist to coordinate activity within and adjacent to the GBRMP between Commonwealth and State governments. Compliance functions are carried out primarily by the QB&FP, although GBRMPA and DERM staff are also authorised officers under the Fisheries Act.

(b) Consultation Process	MEDIUM RISK

Until very recently, consultation was undertaken on a targeted, ad hoc basis, primarily with key stakeholder representative organisations, with formal processes to seek information from the main affected parties on important regulatory changes (e.g. release of Regulatory Impact Statements [RISs] seeking public comment). In mid-2017, a multi-stakeholder Trawl Fishery Working Group

(TFWG) was established as part of the Queensland Government's Sustainable Fisheries Strategy 2017-2027. The objectives of the TFWG are to:

1. To assist with the development of management options for the ECOT Fishery consistent with the Sustainable Fisheries Strategy.
2. To assist with the development of a harvest strategy for the ECOT Fishery by the end of 2018.
3. To provide advice to Fisheries Queensland on operational issues and management of ECOT Fishery

The TFWG includes membership from Fisheries Queensland as well as representatives from the commercial and recreational fishing sectors, GBRMPA and the conservation sector.

The key considerations around whether this SI scores low risk is whether the consultation process regularly seek and accept relevant information from all interested parties, including local knowledge, and whether the management system demonstrates consideration of the information obtained. The medium risk criteria require consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system. While the new consultative structure appears capable of being a mechanism to meet the low risk criteria, the evidence base is limited given the working group has only recently been established. To that end, we have scored this SI medium risk given the management system does include consultation processes which seeks to obtain relevant information from the main affected parties (e.g. through RISs). Should the new consultative structure regularly seek and accept relevant information from all interested parties, including local knowledge, and demonstrates consideration of the information obtained, this SI may score low risk in future assessments.

CRITERIA: (iii) The management policy has clear long-term objectives to guide decision making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.

(a) Objectives **LOW RISK**

The Fisheries Act 1994 contains clear long term objectives that are consistent with Components 1 and 2 and the precautionary approach. These are explicit and required by legislation.

PI SCORE	LOW RISK

3B: Fishery Specific Management System

CRITERIA: (i) The fishery specific management system has clear, specific objectives designed to achieve the outcomes expressed by Components 1 and 2.

(a) Objectives **MEDIUM RISK**

Explicit objectives for the fishery are set out in the *Fisheries (East Coast Trawl) Management Plan 2010*, namely to:

> *provide for the use, conservation and enhancement of the community's fisheries resources by managing the east coast trawl fishery in a way that seeks to— (a) apply and balance the principles of ecologically sustainable development; and (b) promote ecologically sustainable development.*

Although the principles of ESD are consistent with Components 1 and 2, they provide only generic guidance in the management of the fishery and are more consistent with the medium risk rather than low risk SG.

More measurable 'operational' objectives and performance indicators were included in the Performance Management System (PMS) for the fishery, although monitoring against the PMS has been largely discontinued. The adoption of more operational level harvest strategies and ecological risk assessments under the *Queensland Sustainable Fisheries Strategy: 2017–2027* may establish clearer short and long term objectives at the fishery level.

CRITERIA: (ii) The fishery specific management system includes effective decision making processes that result in measures and strategies to achieve the objectives.

(a) Decision Making **MEDIUM RISK**

The Queensland Government Minister responsible for the fisheries portfolio has ultimate responsibility for the management of the fishery, and is empowered to make changes in accordance with powers under the Fisheries Act 1994. The Minister is advised by Fisheries Queensland who, in turn, seek input from stakeholders and technical agencies. Some decisions may be made by the Chief Executive of FQ under a declaration.

A number of changes to management have been made in recent years in response to research and other information. *Fisheries (East Coast Trawl) Amendment Management Plan (No. 1) 2014, Subordinate Legislation 2014 No. 267* effective from 1 March 2015, minimises capture of sea snakes, sea turtles and bycatch species in general. *Fisheries (East Coast Trawl) Amendment Management Plan (No. 1) 2016 Subordinate Legislation 2016 No. 119* effective from 15 July 2016 made changes to mandate the use of best practice scallop SMCEs, best practice escape holes for TEDs and prohibit the use of trawl spikes. Moreover, in response to a recent stock assessment estimating serious depletion of Ballot's Saucer scallop stocks (Yang et al, 2016), the Queensland Government closed six

scallop replenishment areas (SRAs) located off Yeppoon, Bustard Head and Hervey Bay and introduced a winter spawning closure between 1 May and 31 October each year[3]. Stakeholders were consulted on the changes and regulatory impact statements set out the regulatory alternatives and impacts.

Accordingly, there is evidence that the management system responds to serious issues identified by research and monitoring.

Nevertheless, there is less evidence that the management system responds to all issues identified by research, monitoring and consultation in an adaptive and timely manner. A review of the trawl plan commenced in 2009 and continued until 2013 before ultimately being placed on hold in light of the current review of fisheries management in Queensland. DAF noted that only management options necessary for retaining export approvals would be progressed in the meantime.[4]

(b) Use of the Precautionary Approach **MEDIUM RISK**

Although there are clearly examples of precautionary measures in the management of the fishery (e.g. limits on permitted species; large scale spatial closures), the main weakness in the existence of considerable unused effort which, if activated, may change the status of target species and ecosystem components. Moreover, the absence of ongoing independent monitoring of bycatch and ETP species composition and volume limits the capacity of the management system to respond to potential impacts from the fishery. To that end, the fishery does not meet the low risk SG against this SI.

(c) Accountability and Transparency **MEDIUM RISK**

Some information on the performance of the fishery is available to stakeholders through the DAF website (e.g. stock assessments, ERAs, catch and effort history) and on request. The primary mechanism by which the fishery's performance has historically been monitored is through the PMS, with results publicly reported through Annual Status Reports (ASR). In recent years, only core elements of the PMS have been monitored through the stock status assessment process and annual SOCI reporting requirements (DAF, 2015), with the most recent ASR produced for the 2011 fishing year[5]. Where significant management changes are required, a RIS is released calling for public comment. The RIS provides an explanation of the background to the proposed changes and alternative options considered. Nevertheless, in the absence of any formal consultative structure, it is not clear that explanations have been provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring evaluation and review activity. Accordingly, we have scored this SI medium risk. We note that the newly established TFWG – and the public Communiques made available through the DAF website following each meeting - provides a mechanism through which explanations may be provided to stakeholders on any action or lack of action around recommendations arising from research and monitoring.

CRITERIA: (iii) Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.

(a) MCS Implementation **LOW RISK**

The MCS system in the fishery primarily comprises commercial logbooks, monitoring through VMS, at sea and land-based fisheries inspections of all sectors primarily by the QB&FP, occasional aerial surveillance, clear sanctions set out in legislation enforceable through the courts (or administratively depending on the severity of the offence) and promotion of voluntary compliance through education. Priorities for the MCS system are based on formal risk assessments, updated at least every 3-5 years or with major changes in the fishery. The MCS system has a demonstrated ability to enforce relevant management measures (e.g. DAF, 2017c).

(b) Sanctions and Compliance **LOW RISK**

The Fisheries Act 1994 establishes a framework of sanctions to deal with non-compliance, including both criminal and administrative penalties depending on the nature and severity of the offence. Although there is uncertainty about compliance with some regulatory measures (e.g. SOCI logbook reporting), evidence exists that fishers comply with the management system including providing information of importance to the effective management of the fishery. DAF (2017c) report that "*from 2013-16 compliance with ECOTF management arrangements has been high. From 2013 to present, 927 otter trawl vessel inspections were conducted. A total of 273 offences were detected. This translates to an average management regime compliance rate of 86%. In order of decreasing prevalence, the type of offences committed requiring either an official caution or infringement notice with financial penalty ranged from contravening a condition of an authority (includes BRD and TED non-compliance), failing to keep or provide information as required (includes failure to keep logbooks and submit logbook returns), contravention of regulated waters (includes fishing within closure areas or periods), and possession of regulated species or undersized catch. More serious offences that led to prosecution made up only a small percentage of total offences. Most were for failing to keep or provide information as required, possession of regulated species or undersized catch and contravention of regulated waters*".

CRITERIA: (iv) There is a system for monitoring and evaluating the performance of the fishery specific management system against its objectives.
There is effective and timely review of the fishery specific management system.

(a) Evaluation coverage **MEDIUM RISK**

[3] https://www.daf.qld.gov.au/fisheries/consultations-and-legislation/reviews-surveys-and-consultations/scallop-fishing-closures

[4] https://www.daf.qld.gov.au/fisheries/consultations-and-legislation/reviews-surveys-and-consultations/east-coast-trawl-fishery-review

[5] https://www.daf.qld.gov.au/fisheries/monitoring-our-fisheries/data-reports/sustainability-reporting/queensland-fisheries-summary/east-coast-otter-trawl-fishery

Performance of the management system has until recently been monitored through the PMS, which sets out operational objectives and performance indicators across the main elements of the management systems: target species, byproduct species, bycatch species, ecosystems and social indicators. Nevertheless, while longer term options are being considered for future fisheries reform, including the development of harvest strategies, a decision has been made to not monitor against each fishery Performance Management System (PMS) in their entirety. However, the core elements of each PMS are still being monitored by the stock status assessment process and by the annual SOCI reporting. Accordingly, arrangements are in place to evaluate some parts of the management system but arguably not all key parts. Hence, the UoA achieves medium risk.

(b) Internal and/or external review **LOW RISK**

Performance of some aspects of the management system (e.g. stock status) are subject to regular internal review, while others are subject to review over longer cycles (e.g. compliance risk assessments). The fishery is also periodically assessed externally by the Commonwealth Department of Environment and Energy under the *Environment Protection and Biodiversity Conservation Act 1999*.

PI SCORE	MEDIUM RISK

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Annex 1: EKP PSA scores

					Productivity Scores [1-3]									Susceptibility Scores [1-3]						Cumulative only						
Family name	**Scientific name**	**Common name**	**Species type**	**Fishery descriptor**	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependance	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)	Weighting	Weighted Total	Weighted PSA Score	**MSC PSA-derived score**	Risk Category Name	MSC scoring guidepost
	Lepidotrigla argus		Non-invertebrate	EKP shallow/deep	2	2	1	1	1	1	3		1.57	3	3	2	3	2.33	2.81					75	Med	60-79
	Saurida grandisquamis		Non-invertebrate	EKP shallow	1	2	1	1	1	1	3		1.43	3	3	2	3	2.33	2.73					77	Med	60-79
	Platycephalus longispinis		Non-invertebrate	EKP shallow	2	2	1	1	1	1	3		1.57	3	3	2	3	2.33	2.81					75	Med	60-79
	Apogonops anomalus		Non-invertebrate	EKP deep	2	2	1	1	1	1	3		1.57	2	3	2	3	1.88	2.45					86	Low	≥80
	Ratabulus diversidens		Non-invertebrate	EKP deep	2	2	1	1	1	1	3		1.57	3	3	2	3	2.33	2.81					75	Med	60-79
	Saurida filamentosa		Non-invertebrate	EKP deep	2	2	1	1	1	1	3		1.57	3	3	2	3	2.33	2.81					75	Med	60-79