Sustainable Fisheries Strategy 2017–2027

Queensland Coral Fishery

Ecological Risk Assessment Update [Phase 1]

Credit. J. Morton, John Brewer Reef

Queensland Government

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Ecological Risk Assessment Update [Phase 1]

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In collaboration with the Marine Aquarium Fish and Coral Fisheries Working Group.

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Executive Summary

The Queensland Coral Fishery (QCF) is a quota-managed, hand-collection fishery that primarily operates within the confines of the Great Barrier Reef Marine Park (GBRMP). A restricted harvest of corals is also permitted in two small areas of south-east Queensland. As the non-commercial collection of coral is highly restricted within marine parks (Queensland Government, 2019; Great Barrier Reef Marine Park Authority, 2020), most corals are harvested for commercial purposes. Commercial collectors target a range of corals and sea anemones for live international and domestic markets along with live rock, coral rubble and coral sand.

Fishing-related risks in the QCF are being actively addressed through the *Queensland Sustainable Fisheries Strategy 2017–2027*, the *Marine Aquarium Fish and Coral Fisheries Working Group* and the WTO approval. The fishery now operates under a harvest strategy which manages the take of key species through a series of decision rules, trigger limits and reference points (Department of Agriculture and Fisheries, 2021b). The fishery is also the subject of a major management reform program that will transition the QCF to a more comprehensive system of species and genera-specific output controls. These reforms will be supported by corresponding advancements in systems used to monitor, report and validate catch data (Department of Agriculture and Fisheries, 2021e; Department of Agriculture Water and the Environment, 2021; Department of Agriculture and Fisheries, 2022c).

The above reforms represent a significant step forward for the long-term management of risk in this fishery. At the time of this assessment, the structure of the new management regime was still being determined. Consequently, reforms being proposed for the fishery were not taken into consideration in Phase 1 of the QCF ERA update. However, these initiatives will improve the management and monitoring of species targeted in the QCF and contribute to a lowering of species-specific risk ratings. The expanded use of species-specific output controls, additional information on catch compositions and improved mechanisms to monitor and record catch will all be considered in subsequent ERAs (*i.e.* Phase 2 & 3). When and where appropriate these assessments will also incorporate updates for species included in Phase 1 of the QCF ERA.

The QCF has been the subject of two previous assessments designed to quantify the extent and level of risk posed by the fishery. The first QCF Ecological Risk Assessment (ERA) was completed in 2008 and was updated in 2013 (Roelofs, 2008; 2018). This report builds on these initial ERAs and establishes a more adaptive, staged approach to the assessment of risk. Under this strategy, risk profiles for species driving management reforms will be prioritised for assessment (Phase 1). These initial assessments will be built on through subsequent ERAs examining the risk posed to secondary and emerging priorities (Phase 2 & 3).

Methodology used in the 2022 update was aligned with the 2013 report with risk quantified using a *Consequence & Likelihood Analysis* (CLA; Fletcher *et al.*, 2005; Fletcher, 2014; Roelofs, 2018). Under this methodology, risk assessments consider two key components: 1) the extent of a consequence if a species were to experience an undesirable event and 2) the likelihood of the consequence occurring over the next 10 years. To construct the risk profiles, each parameter (*consequence* and *likelihood*) was assigned a score based on a pre-defined set of criteria. Final (combined) risk scores were then used to assign each species with an indicative risk rating of low, moderate, high, or extreme. Risk profile updates were completed at a dedicated QCF ERA workshop. The workshop was held virtually on 28 April 2022 and was attended by a range of stakeholders from the commercial fishing industry, scientific community, the Department of Agriculture and Fisheries (DAF) and the Great Barrier Reef

Marine Park Authority (GBRMPA). Most workshop participants are members of the *Marine Aquarium Fish and Coral Fisheries Working Group*.

A review of key instruments produced a preliminary list of 44 species and genera that were considered for inclusion in Phase 1 of QCF ERA update (this report). Management instruments covered by this review included the *Coral Fishery Harvest Strategy 2021–2026* (Department of Agriculture and Fisheries, 2021a), the Wildlife Trade Operation (WTO) approval (Department of Agriculture Water and the Environment, 2021), the 2013 ERA (Roelofs, 2018) and expert advice for the assessment of the fishery (Pratchett, 2021). This list was rationalised to 22 species with input from the *Marine Aquarium Fish and Coral Fisheries Working Group* (8 April 2022).

Of the 22 species assessed in Phase 1 of the QCF ERA, eight were classified as being at low risk of experiencing an undesirable event due to coral fishing activities. A further seven species were assigned a moderate (n = 3), high (n = 2) or extreme (n = 2) risk rating. Workshop participants recommended that risk assessments for the seven remaining species be deferred until the catch composition data improves. While not universal, increasing rates of harvest, an absence of species-specific catch limits and inadequacies in the catch composition data were all identified as factors that increased the level of risk for one or more species.

Summary of the outputs from the ERA for the Queensland Coral Fishery.

Common name	**Species name**	**Consequence**	**Likelihood**	**Risk value**	***Risk rating***
Priority Species					
Meat coral, Flat cup coral	*Acanthophyllia deshayesiana*	3	4	12	Moderate
Tooth coral	*Acanthastrea pachysepta*	–	–	–	*Not determined*
Thorny staghorn, Icefire	*Acropora echinata*	2	2	4	Low
Strawberry shortcake	*Acropora cf. microclados*	3	4	12	Moderate
Blasto	*Blastomussa wellsi*	2	3	6	Low
Elegance coral	*Catalaphyllia jardinei*	2	3	6	Low
Domed mushroom coral	*Cycloseris cyclolites*	2	2	4	Low
Doughnut coral, Cats eye coral	*Cynarina lacrymalis*	–	–	–	*Not determined*
Whisker coral, Duncan coral	*Duncanopsammia axifuga*	2	2–3	4–6	Low
Bubble-tip anemone	*Entacmaea quadricolor*	2	3	6	Low
Grape coral	*Euphyllia cristata*	–	–	–	*Not determined*
Torch coral	*Euphyllia glabrescens*	3	5	15	High
Hammer coral, Anchor coral	*Fimbriaphyllia ancora*	3	4	12	Moderate
Frogspawn coral	*Fimbriaphyllia divisa*	–	–	–	*Not determined*
Branching hammer coral	*Fimbriaphyllia paraancora*	3	1	3	Low
Anemone coral, Flowerpot coral	*Goniopora stokesi*	–	–	–	*Not determined*
Magnificent sea anemone	*Heteractis magnifica*	–	–	–	*Not determined*
Button coral	*Homophyllia cf. australis*	4	5	20	Extreme
Starry cup coral	*Homophyllia bowerbanki*	2	3	6	Low
Lobed brain coral	*Lobophyllia hemprichii*	–	–	–	*Not determined*
Starry cup coral, Acan	*Micromussa lordhowensis*	4	5	20	Extreme
Open brain coral	*Trachyphyllia geoffroyi*	4	4	16	High

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Definitions & Abbreviations

AIVR	–	Automated Integrated Voice Response (AIVR) system.
CITES	–	*Convention on International Trade in Endangered Species of Wild Fauna and Flora.*
CLA	–	*Consequence & Likelihood Analysis.*
DAF	–	*Department of Agriculture and Fisheries* (Queensland).
DAWE	–	*Department of Agriculture, Water and the Environment* (Commonwealth).
EPBC Act	–	*Environment Protection and Biodiversity Conservation Act 1999.*
ERA	–	Ecological Risk Assessment.
EU	–	*European Union.*
GBRMP	–	*Great Barrier Reef Marine Park.*
GBRMPA	–	*Great Barrier Reef Marine Park Authority.*
ITQ	–	Individual Transferrable Quotas.
QCF	–	*Queensland Coral Fishery.*
TACC	–	Total Allowable Commercial Catch.
WTO	–	Wildlife Trade Operation.

1 Introduction

The Queensland Coral Fishery (QCF) is a quota-managed, hand-collection fishery that primarily operates within the confines of the Great Barrier Reef Marine Park (GBRMP). A restricted harvest of corals is also permitted in two small areas of south-east Queensland (Department of Agriculture and Fisheries, 2022d). Operators collect a range of hard corals, soft corals and anemones for the live aquarium trade and the majority are exported for sale on international markets. While non-commercial coral collection occurs in Queensland, it is subject to significant restrictions and requires a permit in state and commonwealth marine parks (Department of Agriculture and Fisheries, 2021b; Great Barrier Reef Marine Park Authority, 2022a).

The QCF is managed under a range of input and output controls that includes limited licencing, the use of Total Allowable Commercial Catch (TACC) limits, spatial closures, and gear restrictions. In Queensland, commercial coral collection is limited to hand-held implements and most operations rely on scuba or surface supplied air *i.e.,* a hookah (hose) apparatus. Commercial operators are authorised to take coral under a 'D' fishery symbol, of which there are currently 59 authorities (Department of Agriculture and Fisheries, 2022d). While the use of this symbol is managed under fisheries legislation, commercial operations are subject to provisions governing the use of resources within state and commonwealth marine parks (Great Barrier Reef Marine Park Authority, 2020; 2022b).

On 28 October 2021, the QCF was accredited as a three-year Wildlife Trade Operation (WTO) which exempts the fishery from Part 13A export controls outlined in the *Environment Protection and Biodiversity Conservation Act 1999*. The export approval was granted with conditions requiring the fishery to establish and implement a range of management and monitoring reform programs. The WTO also requires the fishery to publish an ERA update by 30 June 2022. The timing of this publication pre-dates the introduction of key management reforms (1 July 2022) and the commencement of research on species compositions; both of which are WTO requirements (Department of Agriculture Water and the Environment, 2021).

The first QCF ERA was completed in 2008 (Roelofs, 2008) and was updated in 2013 (Roelofs, 2018). This report builds on these initial assessments and updates risk profiles for a range of priority QCF species. These species have been identified as priorities in management instruments (*e.g.* the *Queensland Coral Fishery Harvest Strategy 2021–2026,* WTO approval *etc*.) and are the key drivers behind the current management reform program (Department of Agriculture and Fisheries, 2021b; Department of Agriculture Water and the Environment, 2021).

The completion of this report and the supporting Scoping Study (Department of Agriculture and Fisheries, 2022d) fulfills Condition 8 of the QCF WTO (Department of Agriculture Water and the Environment, 2021). This report also establishes a new, more adaptive strategy for assessing risk in the QCF. Herein referred to as 'Phase 1' of a staged ERA approach, this assessment will be followed by subsequent ERAs (Phase 2 & 3) examining the risk posed to additional QCF species. The extent of these subsequent assessments will be dependent on the available data and identifiable harvest priorities.

2 Methods

The methodology used to construct the ERA update was largely aligned with the 2013 assessment (Roelofs, 2018). This approach relies on the use of a *Consequence & Likelihood Analysis* (CLA) to qualitatively assess fishing related risks for application within an ecosystem-based management framework (Fletcher *et al.*, 2005; Fletcher, 2014). This assessment and the key assumptions are covered comprehensively in Fletcher *et al.* (2005); Fletcher (2014); Fletcher & Bianchi (2014) and the 2013 QCF ERA (Roelofs, 2018). Accordingly, only an abridged version will be provided here.

While the broader framework was aligned with the 2013 ERA, the 2022 update employed a different assessment strategy. Under the revised strategy, risk assessment updates were prioritised for a core group of species. These initial assessments (Phase 1) will be built on through subsequent ERAs (Phase 2 & 3) examining the risk posed to other species targeted within the fishery. This approach has been used effectively in other fisheries (*e.g.* the East Coast Inshore Fishery; Jacobsen *et al.*, 2021a; b; c; Pidd *et al.*, 2021) and was considered the most appropriate course of action given the need to meet WTO timeframes and the ongoing nature of the QCF management reform program (Department of Agriculture Water and the Environment, 2021; Department of Agriculture and Fisheries, 2022c).

While the assessment strategy has changed, the **Context**[1] (Fig.1) of the 2013 ERA was retained for the 2022 update *e.g.* the prescribed fishing area, fishing methods and broader operational constraints (Roelofs, 2018). The 2022 ERA also considered risk over a 10-year period and based risk profiles on management arrangements that were in place at the time of the assessment (Roelofs, 2018).[2] When

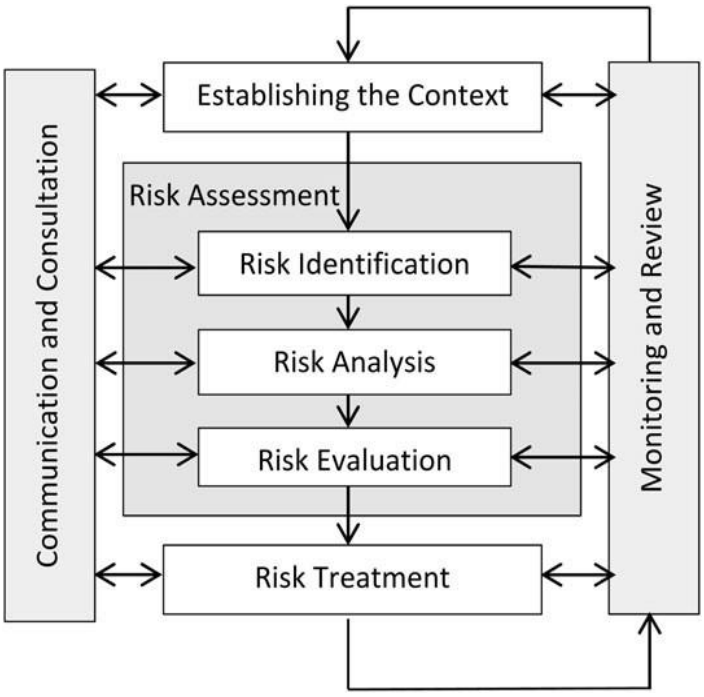

Figure 1. *Excerpt from Fletcher (2014) detailing the broader framework of the risk assessment process. Note—The ERA framework is based on the AS/NZ Standard and has been adapted for use within the fisheries context (Fletcher et al, 2002). This assessment approach has been reviewed and refined since the 2013 ERA (Roelofs, 2018), and the framework consolidated. Further information on the original assessment and the refinement process is provided in Fletcher et al. (2002; 2005; 2014), Fletcher & Bianchi (2014) and Roelofs (2018).*

[1] *In the 2013 QCF ERA, the 'context' component is referred to as 'the scope'. The framework for this approach has since been clarified. For consistency, the QCF ERA update has used the framework provided in Fletcher (2014).*

[2] *Phase 1 of the QCF ERA can only consider management arrangements that were in place at the time of the assessment.*

compared to 2013, the **risk identification**[3] process (Fig. 1) was more streamlined as Phase 1 only considered the risk posed to a core group of priority species (Table A1, Appendix A).

The following provides an overview of criteria used to compile the priority species list, the key information sources and a general overview of the methods used to construct the CLA. For further information on the ERA process refer to Fletcher (2014). For more information on management reforms being proposed for the fishery, consult the WTO approval (Department of Agriculture Water and the Environment, 2021), the affiliated management consultation papers (e.g. Department of Agriculture and Fisheries, 2022c), Departmental advice (department of Agriculture and Fisheries, 2021c; 2022a) and communiques from the *Marine Aquarium Fish and Coral Fisheries Working Group* (Department of Agriculture and Fisheries, 2021d).

2.1 Species rationalisation process

A comprehensive review of key management instruments was undertaken to determine the scope and extent of Phase 1 of the QCF ERA update. The primary objective of this review was to establish a list of species that should be considered for inclusion in the assessment. Factors taken into consideration as part of this review include the prevalence and importance of the species to the QCF, current listings and (if applicable) the requirements to undertake more immediate management reforms. Feedback on the preliminary list was sought from the *Marine Aquarium Fish and Coral Fisheries Working Group* on 8 April 2022 and, once finalised, full justifications were provided for the inclusion or exclusion of each species (Appendix A). Instruments that were considered as part of the species rationalisation process include:

- The *Queensland Coral Fishery Wildlife Trade Operation* (WTO) approval (Department of Agriculture Water and the Environment, 2021);
- *Queensland Coral Fishery Harvest Strategy 2021–2026* (Department of Agriculture and Fisheries, 2021b)*;*
- *Expert Advice for the Assessment of Australian Coral Fisheries – Queensland Coral Fishery 2006–2007 to 2019–2020* (Pratchett, 2021)*;*
- Management reform proposals being considered for the fishery (Department of Agriculture and Fisheries, 2022c); and
- Previous risk assessments for the QCF (Roelofs, 2008; 2018).

2.2 Information sources / baseline references

Where possible, baseline information on the life-history constraints and habitat preferences for each species were obtained from peer-reviewed articles. In the absence of peer-reviewed information, additional material was sourced from grey literature and publicly accessible databases such as the *IUCN Red List of Threatened Species* (www.iucnredlist.org), the *Atlas of Living Australia* (www.ala.org.au), the *Convention on International Trade in Endangered Species of Wild Fauna and*

[3] *In the 2013 QCF ERA, 'risk identification' section was defined as 'Identify species/issues (component tree)'. For consistency, the QCF ERA update has used the framework provided in Fletcher (2014).*

Flora (www.cites.org), *Corals of the World* (http://www.coralsoftheworld.org), *SeaLifeBase* (www.sealifebase.ca), and the *World Register of Marine Species* (https://www.marinespecies.org).

Fisheries data used in Phase 1 of the QCF ERA update was obtained through the commercial fisheries logbook program. While coral collection has an extensive history on the Queensland east coast (Daley & Griggs, 2008), the quality and quantity of the data varies through time. Accordingly, the assessment only considered fishing data collected in the post-2015 period (Appendix B). This data is more representative of the current fishing environment and was used as the baseline for decision rules and trigger limits contained in the *Queensland Coral Fishery Harvest Strategy 2021–2026* (Department of Agriculture and Fisheries, 2021b).

Two supplementary reports were compiled to assist discussions surrounding the allocation of risk scores (refer section 3: results); the *Queensland Coral Fishery Scoping Study* and a Vulnerability Assessment. The Scoping Study is a separate report and contains information on the broader dynamics of the fishery including on catch and effort levels, quota usage and participation rates (Department of Agriculture and Fisheries, 2022d). The complete Scoping Study for the QCF can be accessed through the *Department of Agriculture and Fisheries eResearch Archive* (https://era.daf.qld.gov.au/).

The Vulnerability Assessment provides an indicative evaluation (*i.e.* low, moderate or high) of a species (potential) vulnerability and helps identify key sustainability concerns (Roelofs, 2013). The assessment takes into consideration a range of parameters including accessibility, habitat preference, bleaching susceptibility, abundance, growth, and mode of reproduction (Table A3, Appendix C). Vulnerability assessments were conducted in accordance with Roelofs (2013) and the outputs were used to inform ERA discussions, particularly those relating to the *consequence* analysis. Vulnerability assessments for priority species have been included in this report as Table A4, Appendix C.

2.3 Consequence & Likelihood Analysis

The CLA is a flexible and effective tool for assessing ecological risk in a commercial fishing environment (Fletcher *et al.*, 2005; Fletcher, 2014). It is often used to assess risk in data-poor fisheries, and it has a heavy reliance on input from key stakeholders. A CLA was used in the two previous assessments (Roelofs, 2008; 2018) and the method was adopted for Phase 1 of the QCF ERA update.

The primary purpose of the CLA is to assign risk ratings (low, moderate, high, or extreme) that consider fishing activities in the QCF and their potential to contribute to an undesirable event for one or more species over the next 10 years. Risk scores are based on an evaluation of the extent of an undesirable event (**consequence**) and the **likelihood** of the consequence occurring for each species (Fletcher *et al.*, 2005; Fletcher, 2014). In this context, the definition of an undesirable event is guided by criteria used to assign scores to the consequence component of the analysis (Table 1).

Species-specific scores were assigned to each parameter (*i.e.* consequence and likelihood) at a dedicated QCF ERA workshop held on 28 April 2022. This workshop included representatives from the Department of Agriculture and Fisheries (DAF), commercial coral collectors, scientific experts, and representatives from the Great Barrier Reef Marine Park Authority (Appendix D). The majority of workshop participants are members of the *Marine Aquarium Fish and Coral Fisheries Working Group* (Department of Agriculture and Fisheries, 2021e).

Consequence and *likelihood* scores were assigned to each species based on criteria outlined in Table 1 and Table 2 respectively. These criteria were largely aligned with previous assessments (Roelofs, 2008; 2018). However, attendees at the QCF ERA workshop agreed to implement a subtle but important change to address assessment uncertainty more explicitly. Datasets for corals and sea anemones show considerable variation and a high proportion are viewed as data-poor species. These deficiencies vary between species and, within the ERA realm, increase the level of uncertainty surrounding final risk ratings. This is of some relevance to qualitative ERAs where there is a greater reliance and use of feedback and advice from key stakeholders. The central challenge of the workshop being a) how to account for uncertainty in the assessment process and b) how to ensure that it is addressed consistently across all species included in the assessment.

At the 2022 QCF ERA workshop, participants agreed that the most appropriate way to address uncertainty would be to apply a benchmark or default *consequence* score. Accordingly, the *consequence* score for each species was initially set at 'severe' or 3 with initial deliberations focusing on the adequacy of this rating. If workshop participants agreed that there was sufficient evidence to adjust this score (up or down), then the risk rating was revised accordingly and the reasons behind the decision noted (Appendix E). If the workshop could not form a consensus on an alternate score (*e.g.* due to data deficiencies or uncertainty), then the default score was retained (Appendix E).

Once a species had been assigned a *consequence* (Table 1) and *likelihood* (Table 2) score, the two were multiplied to obtain an overall value. This value was then compared to a series of predefined thresholds to assign each species with a final risk rating *i.e.* ≤ 6 = a low risk, 7–12 = a moderate risk, 13–18 = high risk and 19–30 = extreme risk. These thresholds are consistent with those used in previous assessments (Roelofs, 2018) and are outlined in Table 3.

Table 1. *Detail of consequence table for retained species or species groups (to be considered over a time frame of 10 years). Scores and criteria* adapted *from Roelofs (2018).*

Level	Ecological sustainability of retained species at the local/reef scale
Negligible (0)	Insignificant impacts to populations, (dynamics/structure/size). Unlikely to be measurable against background variability for this population.
Minor (1)	Possibly detectable, but minimal localised impact on population size and none on dynamics.
Moderate (2)	Noticeable local impact, likely minimal impact on regional populations. Short term recruitment/dynamics not adversely impacted.
Severe (3)	Significant impacts on populations, affecting recruitment levels of stocks or their capacity to increase OR used a default (conservative) score when data deficiencies, uncertainty and a lack of evidence restricted the assignment of an alternative.[4]
Major (4)	Long term local depletion if continued. Likely to cause local extinctions, if continued in longer term (i.e. probably requiring listing of species in an appropriate category of the endangered species list e.g. CITES Appendix I).
Catastrophic (5)	Local extinctions are imminent/immediate

[4] The definition for 'Severe (3)' was modified at the 2022 QCF ERA workshop to better account for uncertainty and improve consistency across species-specific assessments.

Table 2. *Detail of likelihood table for target species or species groups (to be considered over a time frame of 10 years). Scores and criteria* adapted *from Roelofs (2018).*

Level	Descriptor
Likely (6)	Is expected to occur often
Occasional (5)	Is expected to occur moderately
Possible (4)	Is expected to occur only infrequently
Unlikely (3)	Unlikely[5]
Rare (2)	Happens only very rarely
Remote (1)	Never heard of, but not impossible

Table 3. *Risk matrix–numbers in cells indicate risk value, the colours/shades indicate risk rankings. Scores and cut-offs taken from Roelofs (2018).*

		Consequence					
Likelihood		**Negligible**	**Minor**	**Moderate**	**Severe**	**Major**	**Catastrophic**
		0	1	2	3	4	5
Remote	1	0	1	2	3	4	5
Rare	2	0	2	4	6	8	10
Unlikely	3	0	3	6	9	12	15
Possible	4	0	4	8	12	16	20
Occasional	5	0	5	10	15	20	25
Likely	6	0	6	12	18	24	30

3 Results

The review of key instruments produced a preliminary list of 44 species and genera that were considered for inclusion in Phase 1 of the QCF ERA update (Appendix A). This list was rationalised to 22 species, of which, 17 had pre-existing risk profiles from the 2013 assessment (Roelofs, 2018).

Of the 22 species progressed to the workshop, eight were classified as being at a low risk, three a moderate risk, two a high risk and two an extreme risk (Table 4). While they were included in Phase 1 of the ERA, the workshop determined that the risk profiles of seven species could not be completed without additional information. In these instances, the species could be assigned a default score for the *consequence* component (Table 1; Table 4). However, discussions surrounding the *likelihood* component were restricted due to an absence of species-specific catch data (Table A2; Appendix B).

[5] *The definition for 'Unlikely' 'was modified from the 2013 assessment (Roelofs, 2018) in response to a workshop recommendation (28 April 2022) that the criteria should be simplified.*

Five species with risk profiles dating back to 2013 were assigned higher risk ratings. The most significant changes were observed in *Micromussa lordhowensis* and *Homophyllia cf. australis* where risk levels increased from low and moderate (respectively) to extreme (Table 4). While not as severe, the risk rating for *Euphyllia glabrescens* and *Trachyphyllia geoffroyi* increased from low and moderate (respectively) to high (Table 4). All five species with higher risk ratings were assigned *consequence* and *likelihood* scores based on workshop deliberations (Appendix E). Accordingly, these increases reflect a change in the fishing or marketing environment *versus* variations in how uncertainty was addressed in the 2013 and 2022 assessments. *Homophyllia bowerbanki* was the only species included in Phase 1 of the QCF ERA update to be assigned a risk rating lower than in the 2013 assessment (Table 4).

Table 4 provides a summary of the risk ratings compiled through the stakeholder workshop and comparative assessments from the 2013 ERA (Roelofs, 2018). A more comprehensive overview of deliberations for each species is provided in Appendix E.

***Table 4**. Risk ratings compiled as part of the Consequence & Likelihood (CLA) Analysis. Risk ratings are based on criteria outlined in Table 1 and Table 2. Pink boxes with '*' represent attributes that were assigned precautionary score due to an absence of species-specific data.*

	2013				2022			
Species name	**Consequence**	**Likelihood**	**Risk value**	***Risk rating***	**Consequence**	**Likelihood**	**Risk value**	***Risk rating***
Acanthophyllia deshayesiana	3	4	12	Moderate	3	4	12	Moderate
Acanthastrea pachysepta	–	–	–	*Not assessed*	3*	–	–	*Not determined*
Acropora echinata	–	–	–	*Not assessed*	2	2	4	Low
Acropora cf. microclados	–	–	–	*Not assessed*	3	4	12	Moderate
Blastomussa wellsi	3	1	3	Low	2	3	6	Low
Catalaphyllia jardinei	3	1	3	Low	2	3	6	Low
Cycloseris cyclolites	2	3	6	Low	2	2	4	Low
Cynarina lacrymalis	3	2	6	Low	3*	–	–	*Not determined*
Duncanopsammia axifuga	3	2	6	Low	2	2–3	4–6	Low
Entacmaea quadricolor	2	3	6	Low	2	3	6	Low
Euphyllia cristata	3	2	6	Low	3*	–	–	*Not determined*
Euphyllia glabrescens	3	2	6	Low	3	5	15	High
Fimbriaphyllia ancora	3	2	6	Low	3	4	12	Moderate
Fimbriaphyllia divisa	3	2	6	Low	3*	–	–	*Not determined*
Fimbriaphyllia paraancora	3	1	3	Low	3*	1	3	Low

	2013				2022			
Species name	**Consequence**	**Likelihood**	**Risk value**	***Risk rating***	**Consequence**	**Likelihood**	**Risk value**	***Risk rating***
Goniopora stokesi	–	–	–	*Not assessed*	3*	–	–	*Not determined*
Heteractis magnifica	3	1	3	Low	3*	–	–	*Not determined*
Homophyllia cf. australis	3	4	12	Moderate	4	5	20	Extreme
Homophyllia bowerbanki	3	3	9	Moderate	2	3	6	Low
Lobophyllia hemprichii	–	–	–	*Not assessed*	3*	–	–	*Not determined*
Micromussa lordhowensis	3	2	6	Low	4	5	20	Extreme
Trachyphyllia geoffroyi	3	3	9	Moderate	4	4	16	High

4 Risk evaluation

When compared to other wild-harvest coral fisheries (*i.e.* outside of Australia), the QCF operates under a more developed management system. Existing monitoring and management systems within this fishery include the use of limited licensing, broad-scale output controls, gear restrictions, individual transferable quotas (ITQ), spatial closures, vessel restrictions and tender/diver limits (Department of Agriculture and Fisheries, 2022d). From 1 September 2021, the QCF has also been managed under the *Queensland Coral Fishery Harvest Strategy 2021–2026*. This harvest strategy, among other provisions, establishes a series of decision rules, trigger limits and reference points to guide the management of key species (Department of Agriculture and Fisheries, 2021b).

The QCF operates mostly within the confines of the GBRMP, and it will be subject to provisions governing the use of resources within the World Heritage Area (Great Barrier Reef Marine Park Authority, 2018; Department of Agriculture and Fisheries, 2022d; Great Barrier Reef Marine Park Authority, Undated). This includes the *Great Barrier Reef (GBR) Representative Areas Program* which restricts or prohibits commercial fishing activities across a significant portion of the marine park. For example, commercial coral collection is not permitted in around 38 per cent of the GBRMP *i.e.* the *Buffer (Olive Green) Zones*, *Scientific Research (Orange) Zones*, *Marine National Park (Green) Zone* and *Preservation (Pink) Zones*. While commercial harvesting is allowed outside these zones, operators must have a permit to legally fish within the GBRMP. Similarly, non-commercial harvest of corals cannot occur within the entire GBRMP without a relevant permit (Great Barrier Reef Marine Park Authority, 2020; 2022b; Undated).

The above provisions assist in the long-term management of risk across the entire QCF and provides regional populations with a degree of protection from over-harvesting. The *GBRMP Representative Areas Program* is particularly effective in terms of managing the broader QCF effort footprint (Department of Agriculture and Fisheries, 2022b; d). From a risk management perspective, these measures have inherent benefits for the long-term, sustainable management of species harvested in this fishery. However, across the fishery there are several factors that increase the risk that one or

more species may experience an undesirable event. These risks and concerns have been reflected in third party approvals (*e.g.* the WTO approval), international instruments (*i.e.* CITES) and through constraints applied by key markets (*e.g.* import prohibitions imposed by the European Union [EU] and the United Kingdom).

In Phase 1 of the QCF ERA update, some of the more prevalent and identifiable risks relate to the adequacy and limitations of the current output control system, increasing harvest rates and limitations in the logbook reporting system. These risks are given further consideration in this section of the ERA, along with mitigation strategies being implemented through the *Queensland Sustainable Fisheries Strategy 2017–2027* (Department of Agriculture and Fisheries, 2017), the WTO approvals process (Department of Agriculture Water and the Environment, 2021) and the *Marine Aquarium Fish and Coral Fisheries Working Group* (Department of Agriculture and Fisheries, 2021d).

Output controls: suitability and effectiveness

Harvest rates in the QCF are managed under a broad-scale system of output controls. Under this system, harvest rates are restricted by a 200 t Total Allowable Commercial Catch (TACC) limit split unevenly between "Specialty Coral" (~60 t) and "Other Coral" (~140 t) (Department of Agriculture and Fisheries, 2022d).[6] The TACC is further divided between fishers using individual transferable quotas (ITQ) assigned to each licence (Department of Agriculture and Fisheries, 2022c).

The use of a broader TACC safeguards the fishery from exponential growth and constrains harvest rates across the entire fishery. Similarly, the use of ITQs reduces the extent of negative fishing patterns associated with competitive catch quotas *e.g.* a 'race to fish' or the overharvesting of species in readily accessible areas. While not enshrined within the legislative framework, fluctuating market demands may also have a bearing on individual rates of harvest and the probability of a species attracting higher levels of effort over an extended period.

While noting the above, there is significant potential for catch and effort to increase at the species or regional level. This means that harvest rates for one or more species could (theoretically) increase and exceed sustainability indicators or reference points before one or more of the TACC limits are exhausted (Pratchett, 2021; Department of Agriculture and Fisheries, 2022d). The extent of this risk will vary across the fishery and will be more prevalent in species that have restricted geographical distributions, are less abundant and those not afforded a *Tier 1* or *Tier 2* classification under the harvest strategy (Department of Agriculture and Fisheries, 2021b).

The risk posed by increasing harvest rates was partly addressed through *Queensland Coral Fishery Harvest Strategy 2021–2026*. This was done through a series of decision rules that a) ensure harvest rates remain within an acceptable level and b) initiates a management response if harvest rates exceed key reference points (Department of Agriculture and Fisheries, 2021b). While noting these provisions, real and potential increases in individual rates of harvest were identified as key risk factors (Appendix E). This risk is arguably most pressing for *H. cf. australis* whose geographic distribution is limited to a small area of the Great Barrier Reef (near Mackay; *pers. comm.* QCF ERA Workshop, 28 April 2022). Catch data for *H. cf. australis* shows that harvest levels (number of pieces) have almost

[6] *The QCF is subject to a significant reform process which will have broad implications for how species are harvested and monitored. At the time of this assessment, this review was still ongoing, and the final construct of the new management regime had not been determined. Phase 1 of the QCF ERA update could only consider management arrangements that were in place at the time of the assessment. When implemented, the new arrangements will be taken into consideration as part of future ERAs involving this species.*

doubled since the 2016/17 fishing season (Department of Agriculture and Fisheries, 2021f; Pratchett, 2021). This risk is compounded by the fact that it is a solitary species; meaning the whole coral is collected *versus* fragging (Pratchett, 2021). Similar catch trends were observed in other species and these increases were given considerable weighting in profiles assigned higher risk scores *e.g. M. lordhowensis; E. glabrescens* and *T. geoffroyi* (Appendix B; Appendix E).

The risk of over-harvesting is being further addressed through the *Queensland Sustainable Fisheries Strategy 2017–2027*, the *Marine Aquarium Fish and Coral Fisheries Working Group* and a reform package being implemented to meet key conditions of the WTO approval. Work has already commenced on a new management regime which will see the fishery transitioned to a more comprehensive system of output controls. Most of these controls / catch limits will be applied at the genus and species level and be complimented by new reporting requirements (see below). These reforms will place significant constraints on the harvest of key species/genera and improve species-specific data records (Department of Agriculture Water and the Environment, 2021; Pratchett, 2021; Department of Agriculture and Fisheries, 2022c).

The proposed reforms represent a significant step forward in terms of the long-term management of risk for key species. Expectations are that these reforms, once implemented, will lead to a lowering of the over-harvesting risk for effected species. For this reason, risk values assigned in this report likely represent a worst-case scenario in terms of the fishing-related risks. The extent of any risk-score reduction may need to be re-evaluated in subsequent ERAs. It is also recognised that the broader risk profile of some Phase 1 species may be influenced by factors outside the control of fisheries management. These confounding factors may have a bearing on the vulnerability of a species to over harvesting (Appendix C).

Data deficiencies and catch composition data

Historical harvest data for the coral fishery has poor species resolution and most is reported with generic identifiers or at a higher taxonomic level *e.g.* family and genus (Department of Agriculture and Fisheries, 2021f; 2022d). These deficiencies are due to a range of issues including the complex nature of coral taxonomy (Veron *et al.*, 2016), difficulties reporting harvest to species level, variations in catch reporting requirements (*e.g.* pieces *versus* weight) and historic inadequacies in the catch reporting system (Department of Agriculture and Fisheries, 2022d). These deficiencies make it difficult to quantify individual rates of harvest and/or assess the long-term over-exploitation risk. For several of the Phase 1 species, these deficiencies were addressed effectively as part of the ERA workshop (held virtually on 28 April 2022). In other instances, data deficiencies resulted in the assignment of more precautionary scores or the deferment of a species assessment (Table 4; Appendix E).

The taxonomic identification of corals has changed substantially through time and continues to be reviewed. Coral classifications have historically been based on the morphology of their microcrystalline skeletal structures (Veron *et al.*, 2016). Evidence suggests that this approach may not sufficiently account for environmental plasticity and geographical variation in coral morphology. Nowadays, molecular taxonomic tools are being employed with more regularity to address taxonomic limitations and reclassify coral species (Veron *et al.*, 2016). The difficulty with this approach is that field identifications rely almost exclusively on morphological nuances. Even then, it can be difficult to differentiate between species within an active fishing environment. This difficulty has directly contributed to observed limitations in the coral logbook data including poor species resolution.

Logbooks used by commercial collectors in the QCF have undergone several updates to improve the adequacy of the data. Data collected in the post-2005 period (*i.e.* 2006/07 season onwards) is generally viewed as a more accurate representation of QCF activities. However, reporting requirements for this period are not uniform. For example, reporting systems used from 2006/07 to 2015/16 estimated harvest weights from corals assigned to different size categories (*i.e.* number of pieces and size). This system is less suited to estimating harvest weights and may have inadvertently contributed to reporting inaccuracies and an under-reporting of quota usage (Department of Agriculture and Fisheries, 2016; Pratchett, 2021).

From 2016/17, the QCF adopted a more effective method for reporting total harvest weights. This system relies on the direct reporting of coral weights and has been refined and built upon in recent years. Fishers are now required to report harvest weights through a range of measures including the use of an expanded logbook and an Automated Integrated Voice Response (AIVR) system (Department of Agriculture and Fisheries, 2021a). Automated Interactive Voice Response technology allows commercial fishers to record catch, check quota balances and track quota usage within a given season.

The above initiatives are complimented by a general improvement in data collected through the logbook reporting system. For example, the QCF logbook (CS06) has been expanded to include 96 species or genera-specific catch categories and mechanisms to report coral piece numbers and weights. The QCF logbook (CS06) continues to be reviewed as part of a broader reform program and further refinements are expected.[7] These future amendments will be linked to the introduction of a more refined system of output controls. They will also be supported by research programs designed to improve our understanding of coral catch compositions. This research has been instigated through reforms required to meet the WTO conditions and industry-led initiatives (Department of Agriculture Water and the Environment, 2021).

Ongoing assessment of risk

Risk assessments for the QCF have previously been done on an *ad-hoc* basis. The first assessment was completed in 2008 and was followed by a 2013 update (Roelofs, 2008; 2018). The management regime for the QCF has undergone considerable change since the completion of the 2013 update (Roelofs & Silcock, 2008; Roelofs, 2013; 2018) and harvest rates for key species have increased (Appendix B). The inherent concern being that risk ratings contained in previous reports are not reflective of the current fishing environment. By extension, this limits the value of these reports and their capacity to inform discussions surrounding the management of harvested species.

Under the phased ERA approach, fishing-related risks in the QCF will be evaluated through an ongoing series of assessments; this report being the first. This approach has been used effectively in other fisheries (*e.g.* the East Coast Inshore Fishery; Jacobsen *et al.*, 2021a; b; c; Pidd *et al.*, 2021) and it is the most appropriate course of action for the QCF. One of the benefits of this approach is that it provides the fishery with a high degree of flexibility in terms of assessing risk and (if applicable) accounting for change. It also establishes a framework that can be readily updated and built upon if,

[7] *The management regime for the QCF is being reviewed as part of the Queensland Sustainable Fisheries Strategy 2017–2027 and Wildlife Trade Operation (WTO) approvals process. The current coral fishery logbook (CS06) will be updated as part of the broader management reform program. The updated logbook (CS07) will include over 100 species and genera-specific catch categories and reflect the new system of output controls.*

for example, a species is identified as an emerging priority by the fisheries working group (Department of Agriculture and Fisheries, 2021d).

This new approach will assist with the ongoing monitoring and management of risk in the QCF. It will also allow for a more regular and consistent assessment of risk.

Coral bleaching and other disturbances

While the primary objective of the ERA is to examine fishing-related risks, a range of external (confounding) factors will influence the risk profiles of species targeted in the QCF. These external risks lie outside the fisheries management framework and often represent an accumulation of broader issues or activities that span a range of stakeholders. With that said, they have the potential to negatively impact the conservation status of these species and exert influence on the long-term structure of the QCF, market trends and catch/effort patterns. In the ERA framework, these externalities are largely accommodated through input from key stakeholders including the GBRMPA and members of the scientific community.

Major disturbances including coral bleaching, crown of thorns starfish outbreaks, coral disease, agricultural runoff, sedimentation and severe weather events (*e.g.* cyclones) are all notable risk factors for the GBR (Great Barrier Reef Marine Park Authority, 2019). These disturbances can result in the stress, deterioration, and mortality of corals and, in sustained events, lead to phase shifts in regional species assemblages. While the extent of these risks and the associated impacts will vary at a spatial and species level, they can be widespread and significant.

The impact of these events on the QCF is not fully understood and are difficult to account for in a fisheries-based ERA.[8] However, research on the thermal sensitivity and bleaching susceptibility of coral species provides insight into some of the potential long-term consequences. This includes research on six Scleractinia corals that were assessed in Phase 1 of the QCF ERA update : *H. cf. australis*; *M. lordhowensis*; *E. glabrescens; T. geoffroyi*; *Catalaphyllia jardinei*; and *Duncanopsammia axifuga* (Table 4, Appendix E; Pratchett *et al.*, 2020a). Despite displaying some interspecific variance, this research showed that all six aquarium species were affected by temperature and bleached to some extent.

As it is difficult to replicate the complex interactions of a coral reef ecosystem, experimental studies provide a more generalised account of how corals may respond to climate change (Camp *et al.*, 2018). As such, results obtained by Pratchett *et al.* (2020a) are not easily translated or transposed to corals and areas actively fished in the QCF. However, research of this nature shows that ecological changes resulting from unprecedented disturbances can affect the construct and (potentially) viability of harvested corals. It further supports the need for targeted monitoring of key coral species to assess their vulnerability to fishing-related and fishery-independent risks (Pratchett *et al.*, 2020b). Improving data on catch compositions, long-term harvest trends and marketability will aid in this process. Likewise, increasing the level of information on harvest rates and species compositions will provide insight into how the dynamics of the fishery may change and adapt in response to environmental change (*e.g.* climate change) or disturbance.

[8] *The last QCF ERA was based on the 2013 season and predated these coral bleaching events.*

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6 Appendices

Appendix A – *Summary of the species rationalisation process.*

Appendix B – *Summary of the relevant and available catch data used in the QCF ERA.*

Appendix C – *Vulnerability Assessment summary including assessment criteria and species-specific (vulnerability) profiles.*

Appendix D – *List of workshop attendees at the Queensland Coral Fishery ERA Workshop held on the 28 April 2022.*

Appendix E – *Summaries of the updated risk ratings for Phase 1 species including feedback, comments, and justifications compiled during the QCF ERA Workshop (28 April 2022).*

Appendix A—Summary of the species rationalisation process

While the Queensland Coral Fishery (QCF) harvests a diverse range of species, a number have been identified as management reform priorities. These species were also prioritised for assessment under Phase 1 of the QCF Ecological Risk Assessment (ERA) update.

To establish the scope of the assessment, a preliminary list of species and genera was compiled through a review of key instruments. These instruments included the *Coral Fishery Harvest Strategy 2021–2026* (Department of Agriculture and Fisheries, 2021b), the Wildlife Trade Operation (WTO) approval (Department of Agriculture Water and the Environment, 2021), management reforms currently being considered for the fishery, the 2013 ERA (Roelofs, 2018) and expert advice on the general management of the fishery (Pratchett, 2021).

Once compiled, species and genera included on the preliminary list were reviewed to determine if they should be assessed in Phase 1 of the QCF ERA update. As part of this process, feedback was sought from the *Marine Aquarium Fish and Coral Fisheries Working Group* on 8th April 2022 regarding what species should be included and omitted from the initial phase of the ERA process.

Table A1: *Summary of the species rationalisation process for Phase 1 of the QCF ERA Update. Key instruments summary: EXP = Expert Advice; HS = Coral Fishery Harvest Strategy 2021–2026; MAN = management reforms being considered for the species; WTO = Attachment B of the current WTO approval; OTH = Other sources including but not limited to logbooks. Red squares with an 'N' are those that have been omitted from the analysis.*

Species Name	Priority	Key Instruments	Comment
Acanthophyllia deshayesiana	Yes	HS, EXP, WTO, MAN	Included as a priority species.
Acanthastrea pachysepta	Yes	EXP	Included as a priority species.
Acropora spp.	No	EXP, MAN, WTO, HS	Extent of risk assessments involving this complex will need to be informed by additional research.
Acropora anthocercis	No	EXP	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.
Acropora bushyensis	No	ERA	Consider including in subsequent ERAs.
Acropora echinata	Yes	EXP, HS, OTH	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.
Acropora cf. microclados	Yes	EXP, HS	Included as a priority species.
Acropora millepora	No	EXP	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.
Acropora multiacuta	No	ERA	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.

Species Name	Priority	Key Instruments	Comment
Acropora nana	No	ERA	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.
Acropora spathulata	No	EXP	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.
Acropora tenuis	No	EXP	Need for future assessment will be dependent on the outcomes of research focused on *Acropora* species compositions.
Alveopora spp.	No	EXP, MAN	Not included as Phase 1 of the QCF ERA update has been confined to the species level. Need to include *Alveopora* spp. in subsequent ERAs will be dependent on the available data.
Blastomussa merleti	No	OTH, MAN	While not included in Phase 1, some consideration will be given to including it as a priority species for Phase 2.
Blastomussa wellsi	Yes	HS, MAN	Included as a priority species.
Catalaphyllia jardinei	Yes	HS, MAN, WTO, OTH	Included as a priority species.
Cycloseris cyclolites	Yes	EXP, MAN, WTO, OTH	Included as a priority species.
Cynarina lacrymalis	Yes	HS, MAN	Included as a priority species.
Duncanopsammia axifuga	Yes	EXP, HS, MAN, WTO, OTH	Included as a priority species.
Entacmaea spp.	No	HS, MAN	Not included as Phase 1 of the QCF ERA update has been confined to the species level. Need to include *Entacmaea* spp. in subsequent ERAs will be dependent on the available data.
Euphyllia cristata	Yes	HS, MAN	Included as a priority species.
Euphyllia glabrescens	Yes	EXP, HS, MAN, WTO, OTH	Included as a priority species.
Entacmaea quadricolor	Yes	HS, OTH, MAN	Included as a priority species.
Fimbriaphyllia ancora	Yes	EXP, HS, MAN, WTO, OTH	Included as a priority species.
Fimbriaphyllia divisa	Yes	HS, MAN, OTH	Included as a priority species.
Fimbriaphyllia paraancora	Yes	HS, MAN, WTO, OTH	Included as a priority species.
Goniopora stokesi	Yes	ERA, OTH	Included as a priority species.
Heteractis magnifica	Yes	HS	Included as a priority species.
Homophyllia bowerbanki	Yes	ERA	Included as a priority species.

Species Name	Priority	Key Instruments	Comment
Homophyllia cf. australis	Yes	HS, EXP, MAN, WTO, ERA	Included as a priority species.
Lobophyllia hemprichii	Yes	EXP	Included as a priority species.
Lobophyllia vitiensis	No	EXP, OTH, MAN	While not included in Phase 1, some consideration will be given to including it as a priority species for Phase 2.
Montipora spp.	No	EXP, MAN, WTO, HS	Not included as Phase 1 of the QCF ERA update has been confined to the species level. Need to include *Montipora* spp. in subsequent ERAs will be dependent on the available data.
Montipora caliculata	No	OTH	While not included in Phase 1, some consideration will be given to including it as a priority species for Phase 2.
Montipora danae	No	EXP	
Montipora nodosa	No	EXP	
Montipora verrucosa	No	EXP	
Moseleya latistellata	No	HS, EXP	
Micromussa amakusensis	No	ERA, EXP	While not included in Phase 1, some consideration will be given to including it as a priority species for Phase 2.
Micromussa lordhowensis	Yes	HS, EXP, WTO, MAN	Included as a priority species.
Paragoniastrea australensis	No	HS, WTO, EXP	
Plerogyra sinuosa	No	HS, WTO, EXP	While not included in Phase 1, some consideration will be given to including it as a priority species for Phase 2.
Pocillopora spp.	No	OTH	Not included as Phase 1 of the QCF ERA update has been confined to the species level. Need to include *Pocillopora* spp. in subsequent ERAs will be dependent on the available data.
Trachyphyllia geoffroyi	Yes	HS, MAN, EXP, WTO, ERA	Included as a priority species.

Appendix B—Available catch data

***Table A2**. Summary of relevant species harvest data reported in the Queensland Coral Fishery Commercial Logbooks. Data presented in Table A2 represent the number of pieces reported against each of the respective categories within a given financial year.*

Species Assessed	***Relevant data / Data Considered***				
Acanthophyllia deshayesiana	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae* ***Genus:*** *Acanthophyllia* ***Species:*** *Acanthophyllia deshayesiana*	1888	3649	5590	5992	7781
Acanthastrea pachysepta	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae* ***Genus:*** *Acanthastrea* ***Species:*** *Acanthastrea pachysepta*	15 086	13 660	19 592	24 252	22 941
Acropora echinata	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Acroporidae* ***Genus:*** *Acropora spp.* ***Species:*** *Acropora echinata*	83 458	91 284	144 764	139 048	100 160
Acropora cf. microclados	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Acroporidae* ***Genus:*** *Acropora spp.* ***Species:*** *Acropora cf. microclados*	83 458	91 284	144 764	139 048	100 160
Blastomussa wellsi	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Plerogyridae* ***Genus:*** *Blastomussa spp.* ***Species:*** *Blastomussa wellsi*	3090	5171	4536	5243	5967
Catalaphyllia jardinei	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Merulinidae* ***Genus:*** *Catalaphyllia spp.* ***Species:*** *Catalaphyllia jardinei*	15 181	13 607	24 374	24 893	30 709
Cycloseris cyclolites	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Fungiidae* ***Genus:*** *Cycloseris spp.* ***Species:*** *Cycloseris cyclolites*	6284	6343	13 426	16 242	17 777
Cynarina lacrymalis	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae* ***Genus:*** *Cynarina spp.* ***Species:*** *Cynarina lacrymalis*	3039	2492	4585	3861	4574
Duncanopsammia axifuga					
Family: *Dendrophyllidae* ***Genus:*** *Duncanopsammia spp.*					

Species Assessed	***Relevant data / Data Considered***				
Species: *Duncanopsammia axifuga*	7713	10 089	11 192	12 204	12 543
Entacmaea quadricolor	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Order: *Actinaria* ***Family:*** *Actiniidae* ***Genus:*** *Entacmaea spp.* ***Species:*** *Entacmaea quadricolor*	1132	1713	2643	2493	2062
Euphyllia cristata	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Euphyllidae* ***Genus:*** *Euphyllia spp.* ***Species:*** *Euphyllia cristata*	3456	2082	3755	4086	5703
Euphyllia glabrescens	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Euphyllidae* ***Genus:*** *Euphyllia spp.* ***Species:*** *Euphyllia glabrescens*	9793	9121	12 011	22 018	32 054
Fimbriaphyllia ancora	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Euphyllidae* ***Genus:*** *Fimbriaphyllia spp.* ***Species:*** *Fimbriaphyllia ancora*	15 158	13 455	18 328	25 572	36 655
Fimbriaphyllia divisa	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Euphyllidae* ***Genus:*** *Fimbriaphyllia spp.* ***Species:*** *Fimbriaphyllia divisa*	3456	2082	3755	4086	5703
Fimbriaphyllia paraancora	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Euphyllidae* ***Genus:*** *Fimbriaphyllia spp.* ***Species:*** *Fimbriaphyllia paraancora*	2150	1378	1587	3492	4643
Goniopora stokesi	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Poritidae* ***Genus:*** *Goniopora spp.* ***Species:*** *Goniopora stokesi*	11 133	14 878	26 121	26 173	29 548
Heteractis magnifica	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Stichodactylidae* ***Genus:*** *Heteractis spp.* ***Species:*** *Heteractis magnifica*	97	111	111	159	60
Homophyllia cf. australis	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae* ***Genus:*** *Homophyllia spp.* ***Species:*** *Homophyllia cf. australis*	21 207	22 362	24 167	36 499	42 202
Homophyllia bowerbanki	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae* ***Genus:*** *Homophyllia spp.*	15 086				

Species Assessed	***Relevant data / Data Considered***				
Species: *Homophyllia bowerbanki*		1762	3466	2658	3254
Lobophyllia hemprichii	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae*	15 086	13 660	19 592	24 252	22 941
Genus: *Lobophyllia spp.*					
Species: *Lobophyllia hemprichii*					
Micromussa lordhowensis	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Lobophylliidae*					
Genus: *Micromussa spp.*					
Species: *Micromussa lordhowensis*	33 215	27 702	40 462	34 525	50 521
Trachyphyllia geoffroyi	***2016/17***	***2017/18***	***2018/19***	***2019/20***	***2020/21***
Family: *Merulinidae*					
Genus: *Trachyphyllia spp.*					
Species: *Trachyphyllia geoffroyi*	8515	11 740	24 260	29 165	40 727

Appendix C—Vulnerability Assessment

Vulnerability Assessments help to identify key sustainability concerns and species that may require further assessment. In the Queensland Coral Fishery (QCF), Vulnerability Assessments are used as a pre-assessment tool to assist in the development of a more comprehensive Ecological Risk Assessment (ERA). The QCF has been the subject of two previous Vulnerability Assessments; one in 2008 (Roelofs & Silcock, 2008) and a second in 2013 (Roelofs, 2013). Since the completion of these assessments, there has been considerable change with respect to how the fishery is managed and the reporting of coral harvests. These changes have altered the fishing environment and will have a significant bearing on how the QCF interacts with key species. For these reasons, it was determined that an updated Vulnerability Assessment would be required prior to the completion of QCF ERA. The following provides a summary of a) criteria used to assess the vulnerability of each species considered in Phase 1 of the QCF ERA update (Table A3) and b) corresponding outputs (Table A4). These results were made available for consideration at a dedicated 2022 QCF ERA workshop held on 28 April 2022.

Table A3. *Outline of attributes used in the assessment of a species' environmental and ecological vulnerability to harvesting activities in the QCF. The methodology is consistent with previous Vulnerability Assessments (Roelofs & Silcock, 2008; Roelofs, 2013), and is based on the model developed for marine molluscs by Ponder & Grayson (1998). As in previous iterations, all vulnerability attributes were given the same weighting, indicating that each attribute was equally important in determining the overall risk. Rankings were scaled in increasing order of risk (i.e., 5 = higher level of risk).*

Attribute	Description/Notes	Category	Score
Accessibility	An assessment of the vertical dimension of a species' distribution. This attribute relates to the level of effort that can potentially be applied to the collection of coral species at a depth. Corals present closer to the surface will require less gear and overall effort for harvesting to take place and are inherently more accessible than deeper-dwelling species.	Very limited accessibility (>60m; very deep water)	1
		Limited accessibility (30 - 60m; specialist diving)	2
		Accessible (10 - 30m; diving only, limited by dive tables)	3
		Readily accessible (5 - 10m; diving, no limits)	4
		Very accessible (0 - 5m; free diving)	5
Habitat/ Ecological Niche	Considers the availability of a species' preferred habitat/niche and its vulnerability to sources of disturbance such as fishing pressure and climatic/weather impacts. *Generalists* – less vulnerable due to the wide range of environments they inhabit which may provide refugia from fishery and climatic impacts and provide a source of recruitment. Includes colonising species ('R' strategists), referring to the species' ability to quickly repair or reproduce to fill disturbed areas following damage. *Specialists* – more vulnerable due to the occupation of restricted niches and/or the development of specialised behaviours/modifications to occupy niche habitats. Likely to be affected by limited	*Generalist* - wide range of habitats and depth preferences; colonising species or 'R' strategists	2
		Specialist - taxa have limited or defined niche; climax species or 'K' strategists	4

Attribute	Description/Notes	Category	Score
	recruitment *e.g.,* if local populations/environments are removed/destroyed through concentrated harvesting, catastrophic climate, or weather events. Includes climax species ('K' strategists) that take longer to recover from disturbances.		
Susceptibility to bleaching	This is a key consideration in the overall vulnerability of corals and is associated with global warming. Bleaching may result from high/low water temperatures, excessive UV radiation/aerial exposure, reduced salinity, high sedimentation, pollutants, or toxins (Glynn, 1991; Hoegh-Guldberg & Salvat, 1995; Brown, 1997; Hoegh-Guldberg, 1999). Criteria adopted from Marshall & Baird (2000). Responses to these impacts is varied and may not result in fatality for the coral host. Bleaching events have been interpreted as an adaptation for survival, with some reef corals able to switch or shuffle symbiont communities in response to environmental change (Baker, 2001).	Low	1
		Moderate	3
		High	5
Abundance	The *abundance* of each genus/species is a key element in their overall vulnerability to harvest. It is likely that the more abundant a genus/species is the more collection pressure the population can tolerate, with the reverse also being true. While the ranking for each genus/species has been determined from the literature, there are limitations to these information sources. Many estimates of abundances for the Great Barrier Reef are from relatively shallow depths (<30m deep) and inter reef areas have not been surveyed. As such, there are currently gaps in our knowledge on the distribution of many coral species. Scores were calculated using the most local-scale information available.	Very common	1
		Common	2
		Moderately common	3
		Uncommon	4
		Rare	5
Growth rates	The size of individual coral polyps or corallites is negatively correlated to a species' growth rate. Larger polyp sizes tend to indicate slower growth rates and longer maturation rates. Branching corals tend to have more perforated skeletons and grow faster than massive corals which have very dense skeletons. Free-living, solitary corals also have dense heavy skeletons and have slow growth rates. Growth rates presented here have been adapted from Kelley (2009).	Colonies that are branching or plates of branchlets - corallite size </= 2mm	1
		Colonies that are meandering ridges and valleys in any shape colony - corallite size 1 - 10mm	2
		Colonies that are massive, thick or comprise thin plates or crusts - corallite size <8mm - 20mm	3
		Corals with large, daytime expanded polyps and large tentacles with heavy skeletons (excluding *Catalaphyllia, Euphyllia*, and *Plerogyra*)	4
		Solitary, isolated, or free-living colonies with large polyp sizes (50-300mm) (including *Catalaphyllia*, *Euphyllia*, and *Plerogyra*)	5

Attribute	Description/Notes	Category	Score
Mode of reproduction	This attribute is presented here as a proxy for local-scale depletion vulnerability. A species' capacity to recover from collection or disturbance events is related to its recruitment and growth potential. Recovery can occur through regrowth and fragmentation of colonies. However, successful reproduction in depleted populations is also dependent on the density of mature animals to produce enough recruits for recovery (Jones *et al.*, 2008). Corals employ a variety of reproductive strategies, the most well-known being the synchronised mass spawning events (broadcast spawning) that occur in summer months. While most recorded species are broadcast spawners, a proportion have developed alternate reproductive strategies such as brooding. It has been suggested that around 82 per cent of all species that have been observed employ broadcast spawning, with 14 per cent displaying brooding characteristics (Harrison, 2011). Different levels of vulnerability are present between the two reproductive modes, especially when it comes to the recovery of denuded populations at the local scale (*e.g.,* patch or reef scale). Gradual release brooder corals typically recruit within metres of the parent. While these larvae are considered robust in terms of survival, the recovery of a local population is highly dependent on the fecundity, mode of reproduction, health, and density of adult colonies. In this case, recruitment from wider sources is not guaranteed in the short term.	Hermaphroditic broadcast spawners	2
		Gonochoric broadcast spawners	3
		Brooders with mass release of larvae/eggs	4
		Brooders with gradual release of larvae/eggs	5

Table A4. *Summary of the Vulnerability Assessment profiles compiled for each species assessed in Phase 1 of the Queensland Coral Fishery (QCF) Ecological Risk Assessment (ERA) update program. Criteria used to assign a score to each of the respective attributes has been provided in Appendix C, Table A3. As per Roelofs (2013), attributes that could not be assigned a score (N/S) were not included in the Vulnerability Ranking calculations.*

Genus	Species	Reproduction rank	Growth rank	Niche rank	Bleaching rank	Accessibility rank	Abundance rank	2022 Vulnerability Score	2022 Vulnerability Rank
Acanthophyllia	*deshayesiana*	2	5	2	N/S	4	4	3.4	Moderate
Acanthastrea	*pachysepta*	3	5	N/S	N/S	4	N/S	4	High
Acropora	*echinata*	2	1	2	5	4	4	3	Moderate
Acropora	*cf. microclados*	2	1	2	5	4	4	3	Moderate
Blastomussa	*wellsi*	3	3	4	3	3	3	3.16	Moderate
Catalaphyllia	*jardinei*	3	5	4	1	4	3	3.33	Moderate
Cycloseris	*cyclolites*	3	5	4	1	2	2	2.83	Low
Cynarina	*lacrymalis*	2	5	4	3	4	4	3.67	Moderate
Duncanopsammia	*axifuga*	3	4	2	1	4	3	2.83	Low
Entacmaea	*quadricolor*	3	N/S	2	5	4	2	3.2	Moderate
Euphyllia	*cristata*	4	5	2	1	4	5	3.5	Moderate
Euphyllia	*glabrescens*	5	5	2	3	4	2	3.5	Moderate
Fimbriaphyllia	*ancora*	3	5	3	3	4	2	3.33	Moderate
Fimbriaphyllia	*divisa*	3	5	2	3	4	3	3.33	Moderate
Fimbriaphyllia	*paraancora*	3	5	2	3	3	3	3.16	Moderate
Goniopora	*stokesi*	3	4	4	1	4	4	3.33	Moderate
Heteractis	*magnifica*	3	N/S	2	3	4	2	2.8	Low
Homophyllia	*cf. australis*	3	5	4	5	4	3	4	High
Homophyllia	*bowerbanki*	2	3	2	3	4	4	3	Moderate
Micromussa	*lordhowensis*	2	3	2	5	4	3	3.16	Moderate
Lobophyllia	*hemprichii*	2	3	2	1	4	1	2.17	Low
Trachyphyllia	*geoffroyi*	3	5	4	1	3	3	3.17	Moderate

Appendix D—List of workshop attendees

Table A5. *List of attendees at the virtual Queensland Coral Fishery ERA Workshop held on 28 April 2022.*

Name	Position	Sector
Michael Mikitis	Chair	Fisheries Queensland
Sam Miller	Fishery Manager	
Imraan Esat	Fishery Manager	
Ian Jacobsen	Principal Policy Officer	
Graeme Broughall	Queensland Boating and Fisheries Patrol	
Jessica Stella	Great Barrier Reef Marine Park Authority	Environment
Randall Owens	External researcher or scientist	Expert
Morgan Pratchett	External researcher or scientist	Expert
Daniel Kimberley	Commercial fisher	Commercial Harvest Industry
Darren Brighton	Commercial fisher	
Dean Pease	Commercial fisher	
Don Gilson	Commercial fisher	
Lyle Squire	Commercial fisher	
Ros Patterson	Commercial fisher	
TBA	Indigenous representative	Aboriginal and Torres Strait Islander communities
Observers		
Jasmine Morton	Fisheries Biologist	Fisheries Queensland
Eliza Dedini	Fisheries Technician	

Appendix E—Workshop risk rating feedback, comments and justifications

The preliminary list of species was based on a review of key instruments relating to the management of this fishery including the *Coral Fishery Harvest Strategy 2021–2026* (Department of Agriculture and Fisheries, 2021b), the Wildlife Trade Operation (WTO) approval (Department of Agriculture Water and the Environment, 2021), management reforms currently being considered for the fishery, the 2013 ERA (Roelofs, 2018) and expert advice on the general management of the fishery (Pratchett, 2021). 'Priority' species are those being proposed for inclusion in Phase 1 of the updated QCF ERA.

Phase 1 of the ERA update will be followed by subsequent assessments examining the risk posed to a range of additional species (Phase 2 & 3). These assessments will incorporate information collected from the updated logbook and research initiatives currently in development *e.g.* research required under the WTO and industry-led initiatives. The risk profiles for species included in Phase 1 will also be reviewed and (where appropriate) updated to take into consideration any new information.

Given their influence on the management reform program, the QCF ERA workshop prioritised updates involving species on Attachment B of the QCF WTO approval (Department of Agriculture Water and the Environment, 2021; Pratchett, 2021). The following details the final risk rating summaries for each species considered at the 28 April 2022 workshop. The summaries include feedback, comments, and justifications that emerged from the workshop.

1.1 Acanthophyllia deshayesiana

***Acanthophyllia deshayesiana* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3	4	12
2022 ERA Update	3	4	12
Comments/Feedback (2022 ERA)			
Common Name – Meat coral", "Flat cup coral", ***Synonyms –*** *Cynarina deshayesiana, Scolymia vitiensis* ***Notes*** – *Acanthophyllia deshayesiana* was included in Phase 1 of the QCF ERA update due to its listing in attachment B of the most recent WTO approval. The workshop noted that *A. deshayesiana* is located from the Torres strait to south of Townsville. The species is easily identifiable and there is less likelihood that the *A. deshayesiana* data includes additional species. Desirable colour morphs and small specimens are targeted due to their marketability whereas large or dull coloured specimens are unsuitable for sale. Harvest rates (number of pieces) for *A. deshayesiana* have increased substantially and the workshop identified this as a regional risk factor. This risk is compounded by the fact that a) there is limited information on regional abundances and b) recent disturbance events may have impacted regional population densities. The species is primarily targeted from Cairns north and anecdotal evidence suggests that localised impacts could be observed over the coming decade. There is a lower probability that fishing activities will cause a significant impact on the long-term conservation status of		

Acanthophyllia deshayesiana – ERA Summary
the species (as a whole) *i.e.* across the known range. This is due to *A. deshayesiana* having a wide distribution and a comparatively high level of abundance including in areas that are closed to fishing. At a regional level, the workshop agreed that there was in increased probability that fishing activities will impact local populations and/or regional recruitment rates. With evidence showing that harvest rates have increased through time, it is possible that this consequence will occur in the next decade. For this reason, the conservative risk score has been maintained as the assessment needed to account for unknown entities and a lack of quantitative data. **Based on the available information, the overall dynamics of the *A. deshayesiana* risk profile has not changed, and a moderate-risk rating was maintained with the 2013 ERA.**

1.2 Acanthastrea pachysepta

Acanthophyllia pachysepta – ERA Summary			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	*Not assessed*	*Not assessed*	*Not assessed*
2022 Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name – *"Tooth coral"* ***Synonyms*** – *Lobophyllia pachysepta* ***Notes*** – *Acanthastrea pachysepta* was one of small number of species where the coral ERA workshop recommended that the assessment be delayed. As harvest-rate data for *A. pachysepta* is not available, any workshop assessment would be based on data compiled at the genus level; noting that *A. pachysepta* has previously been classified as part of the *Lobophyllia* spp. complex. This data shows that harvest rates for this complex (*Lobophyllia* spp.) have increased from around 9800 pieces in 2013 to over 20 000 pieces. Deficiencies in the harvest data (including taxonomic-related issues) makes it difficult to assign risk ratings to both parameters *i.e. consequence* and *likelihood*. Under the revised criteria, a default conservative score of 'Severe' (3) could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component would be more difficult as there is (currently) limited understanding of a) how extensively *A. pachysepta* is harvested in the QCF and b) the contribution it makes to the total QCF harvest. This limits the extent of any species-specific comparisons and provides limited insight into the level of risk posed to this species. **When and where appropriate, *A. pachysepta* will be considered for inclusion in subsequent ERAs involving the QCF. The ability to assess this species will be dependent on the available data.**			

1.3 *Acropora echinata*

***Acropora echinata* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	*Not assessed*	*Not assessed*	*Not assessed*
2022 Update	2	2	4
Comments/Feedback (2022 ERA)			
Common Name *– "Thorny staghorn", "Icefire"* ***Synonyms*** *– N/A* ***Notes –*** *Acropora echinata* was included in the first phase of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026. Acropora spp.* has also been listed in attachment B of the WTO approval. *Acropora echinata* was not included in previous QCF risk assessments and species-specific data was not available for the workshop. Harvest rates for the *Acropora spp.* subgroup though have increased through time. The workshop noted that *A. echinata* is an uncommon, fast-growing coral that is usually found as large colonies in deeper water. Site fidelity is common for this species and it is the dominant species in certain locations. Although *Acropora spp.* are susceptible to bleaching, participants agreed that the species is normally unbleached in deep water. Potential consequences are further reduced by *A. echinata* now being heavily fragged to meet market demand. Workshop consensus was that there may be a noticeable impact on local populations through time due to harvesting. The workshop though considered this to be a rare event due to the niche habitat, fast growth, and recruitment potential of *A. echinata* colonies. These factors enable them to recover quickly post-harvest. **Based on the available information, the risk profile of *A. echinata* was assigned a risk rating of low.**			

1.4 *Acropora cf. microclados*

***Acropora cf. microclados* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	*Not assessed*	*Not assessed*	*Not assessed*
2022 Update	3	4	12
Comments/Feedback (2022 ERA)			
Common Name – "Strawberry shortcake" ***Synonyms*** *– Acropora microclados* ***Notes –*** *Acropora cf. microclados* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*. *Acropora spp.* has also been listed in attachment B of the WTO approval. *Acropora cf. microclados* was not			

Acropora cf. microclados – ERA Summary
included in previous QCF risk assessments and species-specific data were not available for the workshop. Harvest rates for the *Acropora spp.* subgroup though have increased through time. This species is fast growing displays a degree of habitat specificity but is generally found in low abundance. It usually occurs in shallow water environments (some colonies present in deeper water) and is susceptible to bleaching. The fishery only harvests/targets *A. cf. microclados* at the margins of tabular colonies. Propagation of this species also involves the take of small fragments allowing post-harvest growth to continue at the propagation site. The workshop noted that *A. cf. microclados* is viewed as a taxonomically distinct species and it requires further review and classification. As there is limited information on the total rate of harvest, the workshop needed to adopt a more pragmatic assessment approach. Workshop participants agreed that a precautionary ***consequence*** score of 3 is warranted due to data deficiencies. However, it was recognised that harvest methods would help to minimise the extent and longevity of these impacts. More broadly, the workshop acknowledged that a) harvest levels for *Acropora spp.* have increased through time and b) the species may be more susceptible to heat stress and climate change. These factors make the likelihood of a long-term decline more plausible. Given these considerations, the consensus of the workshop was to assign *A. cf. microclados* a higher *likelihood* score. **Based on the available information, the risk profile of *A. microclados* was assigned a risk rating of moderate.**

1.5 Blastomussa wellsi

Blastomussa wellsi – ERA Summary			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 3 – Cairns, 2 – Other	1 – Keppel, 1 – Cairns, 1 – Other	3 – Keppel, 3 – Cairns, 2 – Other
2022 Update	2	3	6
Comments/Feedback (2022 ERA)			
Common Name – "Blasto" ***Synonyms*** – *N/A* ***Notes –*** *Blastomussa wellsi* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*. While harvest rates (number of pieces) have increased for this species, it was not identified as a significant or substantial area of concern. Feedback indicates that *B. wellsi* is reasonably abundant in lower-light, deeper water environments. From an operational perspective, these deeper water environments are more difficult to access and provide regional populations with a degree of protection from commercial fishing/harvesting activities. These risks or potential consequences are further reduced by the fact *B. wellsi* is now heavily propagated/fragged to meet market demand. While the updated *consequence* score is lower than the 2013 assessment, the workshop supported an increase to the *likelihood* score. The reason for this decision was that there is an increased			

***Blastomussa wellsi* – ERA Summary**
probability that the consequences (*e.g.* noticeable but short-term local impacts) will be observed at a regional level over the next 10 years (assuming that the management regime was not altered significantly over this period). **Based on the available information and when compared to the 2013 assessment, the dynamics of the *B. wellsi* risk profile changed with the overall score increasing marginally (2013 = 3; 2022 = 6). This change was not sufficient to shift the species from a 'low' risk rating.**

1.6 Catalaphyllia jardinei

***Catalaphyllia jardinei* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 3 – Other	1 – Keppel, 1 – Other	3 – Keppel, 3 – Other
2022 ERA Update	2	3	6
Comments/Feedback (2022 ERA)			
Common Name – *"*Elegance coral" ***Synonyms –*** *N/A* ***Notes*** – *Catalaphyllia jardinei* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026* and listed in attachment B of the WTO approval While harvest levels (number of pieces) for *C. jardinei* have increased over the last 10 years, the workshop did not view this as a current area of significant concern. The workshop further agreed that *C. jardinei* has high regional abundance and displays strong recruitment. The group noted that *C. jardinei* is relatively robust, and noticeable impacts on localised populations has not been observed in areas with frequent harvesting. Unlike other species in the assessment, abundance estimates/assessments for *C. jardinei* were also supported by a reasonable baseline of fisheries-specific data. Based on the above deliberations, the *consequence* score for *C. jardinei* was reduced. This decision was underpinned by the known short-term recruitment of *C. jardinei* and industry observations regarding regional abundance levels. While the *consequence* score was downgraded, the *likelihood* rating was increased to 3. The decision to increase this score was due to a) the increased probability that the (lower) consequence would be observed at a regional level and b) evidence that reginal depletion has been known to occur elsewhere in its range (see IUCN redlist assessment).* **The overall dynamics of the *C. jardinei* risk profile has changed since the last assessment. These changes resulted in a marginal increase to the overall risk score (2013 = 3; 2022 = 6) but did not shift the species from a 'low' risk rating.** **** IUCN ratings were based at the global scale and will consider activities from developing countries and regions. While not universal, management systems used in these regions are less advanced when compared to the QCF.***			

***Catalaphyllia jardinei* – ERA Summary**
Note—*C. jardinei is one of a small number of species that cannot be imported to the United Kingdom and European Union. These international bans were recognised in the workshop but were not viewed as sufficient grounds to assign C. jardinei with a rating above 'low'.*

1.7 Cycloseris cyclolites

***Cycloseris cyclolites* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	2	3	6
2022 ERA Update	2	2	4
Comments/Feedback (2022 ERA)			
Common Name – *"*Domed mushroom coral" ***Synonyms –*** *Fungia cyclolites* ***Notes*** – *Cycloseris cyclolites* was included in Phase 1 of the QCF ERA update as it is listed in Attachment B of the WTO export approval. While harvest rates for *C. cyclolites* (number of pieces) have increased since 2017, the workshop did not identify this as a significant area of concern. Feedback indicated that *C. cyclolites* is relatively abundant, with higher density observed from Swain's Reef to Lizard Island region. Selectivity is evident towards specific colour morphs, with preferences shown to orange and green respectively (brown is considered undesirable). From an industry perspective, colour selectivity provides refuge from harvesting to a portion of the population. Overall, *C. cyclolites* exhibits reasonable recruitment, and appears to be robust to harvesting. Participants recognised that additional information on the distribution of *C. cyclolites* was still required. However, it was agreed that there was sufficient justification to move from the 'default' position and assign the species with a more moderate *consequence* score. Despite catch increasing over recent years, the known hardiness of this species, combined with the IUCN ranking of least concern, provided sufficient justification to reduce the *likelihood* score. **The overall dynamics of the *C. cyclolites* risk profile has changed since the last assessment with the total risk declining marginally (2013 = 6; 2022 = 4). This change did not shift the species from a 'low' risk rating.**			

1.8 Cynarina lacrymalis

***Cynarina lacrymalis* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Cairns, 3 – Other	2 – Cairns, 1 – Other	6 – Cairns (reflects red colour variety), 3 – Other (reflects red colour variety)

***Cynarina lacrymalis* – ERA Summary**			
2022 ERA Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name – *"*Doughnut coral", "Solitary cup coral", "Cats eye coral" ***Synonyms –*** *N/A* ***Notes*** – *Cynarina lacrymalis* was a low assessment priority and was not evaluated as part of the 28 April 2022 QCF ERA workshop. Harvest-rate data is available for *C. lacrymalis* and shows that catch levels have increased from 3025 pieces in 2013 to 4574 pieces in the 2020/21 season. Under the revised criteria, a default conservative score of 'Severe' (3) could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component would require more consultation. **When and where appropriate, *C. lacrymalis* will be considered for inclusion in subsequent ERAs involving the QCF.**			

1.9 Duncanopsammia axifuga

***Duncanopsammia axifuga* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 2 – Cairns, 1 – Other	2 – Keppel, 1 – Cairns, 1 – Other	6 – Keppel, 2 – Cairns, 2 – Other
2022 ERA Update	2	2 – 3*	4 – 6*
Comments/Feedback (2022 ERA)			
Common Name – *"*Whisker coral" and "Duncan coral" ***Synonyms –*** *N/A* ***Notes*** – *Duncanopsammia axifuga* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026* and listed in Attachment B of the WTO approval. While harvest rates (number of pieces) for *D. axifuga* have increased, the workshop did not view it as a significant or substantial area of concern. Feedback indicates that *D. axifuga* is highly resilient, and individual fragments are targeted *versus* larger colonies. Despite increases in the number of fragments being harvested, *D. axifuga* is considered robust and local populations display minimal evidence of long-term harvesting degradation. In recent years, a shift in consumer demand and marketability has been observed. The workshop noted that historically, larger pieces were harvested but the current market favours smaller fragments or single polyps. Participants were also advised that fragments are more commonly collected from a depth range of 8-30 metres instead of the broader 2–30 metres depth profile described in the 2013			

Duncanopsammia axifuga – ERA Summary
assessment. While difficult to quantify, this operational preference may reduce harvesting pressures for shallow water colonies that display a higher susceptibility to bleaching. At the end of deliberations, participants supported the decision to decrease the *consequence* score and increase the likelihood score. This decision was based on the understanding that a) smaller fragments are collected instead of larger colonies and b) the overall number of pieces has only increased marginally. There was however some discussion surrounding the need to assign the species a *likelihood* score of 3. The premise of these discussions being that a *likelihood* score of 3 may be too conservative. Assigning *D. axifuga* a *likelihood* score of 2 or 3 will have negligible impact on the final risk rating. As the species was assigned a *consequence* score of 2, the species will be classified as a low risk if it assigned a *likelihood* score of 3 or lower. In this instance, it was agreed that the *likelihood* score should be set at 2–3* and a final risk score at 4–6 (low risk) in recognition of the workshop discussions. Expectations are that the risk profile of *D. axifuga* could be further refined as harvest data improves through time. **Based on the available information, the overall dynamics of the *D. axifuga* risk profile has changed marginally but did not shift the species from a 'low' risk rating.** ***Note—****D. axifuga is one of a small number of species that cannot be imported to the United Kingdom and European Union. These international bans were recognised in the workshop but were not viewed as sufficient grounds to assign D. axifuga with a rating above 'low'.*

1.10 Entacmaea quadricolor

Entacmaea quadricolor – ERA Summary			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	2 – Keppel, 1 – Cairns, 1 – Other	3 – all regions	6 – Keppel, 3 – Cairns, 3 – Other
2022 ERA Update	2	3	6
Comments/Feedback (2022 ERA)			
Common Name – "Bubble-tip anemone" ***Synonyms –*** *Actinia quadricolor* ***Notes*** – *Entacmaea quadricolor* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*. While harvest rates (number of species) have increased for *E. quadricolor*, this increase was not identified as a significant or substantial area of concern. Feedback indicates that *E. quadricolor* is less readily harvested in the QCF. From an operational perspective, it is less profitable to harvest *E. quadricolor* as this is a delicate anemone that requires additional labour and handling. Moreover, commercially harvested species are consumer driven and, in recent years, there has been a higher demand for corals. When harvested,			

***Entacmaea quadricolor* – ERA Summary**
marketability and selectivity of specific colour morphs provide a degree of protection for regional populations. **The risk scores for *E. quadricolor* replicate results obtained in the previous (2013) assessment. Final scores for this species considered the available information and observations from the workshop participants.**

1.11 *Euphyllia cristata*

***Euphyllia cristata* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3	2	2
2022 Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name – *"*Grape coral" or "Fat tentacle torch coral" ***Synonyms –*** *N/A* ***Notes*** – The decision to include *E. cristata* in the workshop material was a precautionary measure. It is not listed under Attachment B of the WTO approval and/or singled out in the *Coral Fishery Harvest Strategy 2021–2026*. Species-specific data is not available for this species and harvest rates are reported to the genus level (*Euphyllia* spp.) Under the revised criteria, a default conservative score of 'Severe' (3) could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component would be more difficult as there is (currently) limited understanding of a) how extensively *E. cristata* is harvested in the QCF and b) the contribution it makes to the total QCF harvest. This limits the extent of any species-specific comparisons and provides limited insight into the level of risk posed to this species. For these reasons, the workshop recommended that the *E. cristata* re-assessment be delayed until there is improved information on species compositions**.** **When and where appropriate, *E. cristata* will be considered for inclusion in subsequent ERAs involving the QCF. The ability to assess this species will be dependent on the available data.**			

1.12 *Euphyllia glabrescens*

***Euphyllia glabrescens* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 2 – Other	2 – Keppel, 1 – Other	6 – Keppel, 2 – Other
2022 ERA Update	3	5	15
Comments/Feedback (2022 ERA)			
Common Name – *"*Torch coral"			

***Euphyllia glabrescens* – ERA Summary**
Synonyms – *N/A*
Notes – *Euphyllia glabrescens* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*.
Fishing data indicates that harvest rates for *E. glabrescens* have increased considerably in recent times. This increase was identified as a key risk factor for this species. Feedback indicates that consumer demand for *E. glabrescens* has increased considerably over recent years. From an industry perspective, these demands have elevated the pressure on *E. glabrescens* and its viability to sustain increased harvesting. These demands are not universal, with more desirable colour morphs being targeted with more regularity. As colour morphs appear to be location dependant, this increases the potential for localised depletions. Despite this, industry noted that good recruitment is still observed in heavily fished areas.
The workshop supported maintaining the *consequence* score of 3. There was however general agreement that the *likelihood* score should be increased. The reason behind this decision is that there was a high probability that the species would experience regional depletions over the next 10 years if the management regime did not change.
Based on the available information the *E. glabrescens* risk profile has changed since the last assessment. With an increased *likelihood* score, the species registered an overall risk score of 15 (up from 6). As a result of this increase, the species shifted from a 'low' risk to 'high' risk.
Note—*E. glabrescens is one of a small number of species that cannot be imported to the United Kingdom and European Union. These international bans were recognised in the workshop.*

1.13 Fimbriaphyllia ancora

***Fimbriaphyllia ancora* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 2 – Other	2 – Keppel, 1 – Other	6 – Keppel, 2 – Other
2022 Update	3	4	12
Comments/Feedback (2022 ERA)			
Common Name – "Hammer coral", "Anchor coral"			
Synonyms – *Euphyllia ancora*			
Notes – *Fimbriaphyllia ancora* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026* and listed in Attachment B of the WTO approval.			
Harvest rates (number of pieces) for *F. ancora* have increased through time and the workshop identified elevated fishing pressures as a prominent area of concern. The workshop noted that *F. ancora* will experience selective harvesting pressures as the market prefers more desirable colour morphs. The inherent trade off being that less-desirable morphs will not be targeted or, if retained, harvested in smaller quantities.			

Fimbriaphyllia ancora – ERA Summary
A *consequence* score of 3 was retained for this species as there is an increased probability that regional populations will be impacted by fishing activities. Likewise, the workshop determined that there was a higher risk that (increased) harvesting will have a detrimental impact on regional stocks over the next 10 years (if the management regime does not change). As part of these deliberations, workshop participants agreed that the *likelihood* score should be increased to reflect the growing market demand for *F. ancora*. **Based on the available information the risk profile for *F. ancora* has changed since the last assessment (2013 = 6; 2022 = 12) with the species now classified as a moderate risk.** ***Note—****F. ancora is one of a small number of species that cannot be imported to the United Kingdom and European Union. These international bans were recognised in the workshop and considered as part of the assessment process.*

1.14 Fimbriaphyllia divisa

Fimbriaphyllia divisa – ERA Summary			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 2 – Other	2 – Keppel, 1 – Other	6 – Keppel, 2 – Other
2022 Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name *– "Frogspawn coral"* ***Synonyms*** *– Euphyllia divisa* ***Notes*** *– Fimbriaphyllia divisa* was one of small number of species where the coral ERA workshop recommended that the assessment be delayed. As harvest-rate data for *F. divisa* are not available, any workshop assessment would need to be based on data compiled at the genus level; noting that *F. divisa* has previously been classified as part of the *Euphyllia* spp. complex. This data shows that harvest rates for this complex (*Euphyllia* spp.) have increased from 2082 (2017/18) pieces to 5703 pieces (2020/21). Deficiencies in the harvest data makes it difficult to assign risk ratings to both parameters *i.e. consequence* and *likelihood*. Under the revised criteria, a default conservative score of 'Severe' (3) could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component would be more difficult as there is (currently) limited understanding of a) how extensively *F. divisa* is harvested in the QCF and b) the contribution it makes to the total QCF harvest. This limits the extent of any species-specific comparisons and provides limited insight into the level of risk posed to this species. **When and where appropriate, *F. divisa* will be considered for inclusion in subsequent ERAs involving the QCF. The ability to assess this species will be dependent on the available data.**			

1.15 *Fimbriaphyllia paraancora*

***Fimbriaphyllia paraancora* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3	1	3
2022 Update	3 (default score)	1	3
Comments/Feedback (2022 ERA)			
Common Name – *"*Branching Hammer Coral", "Green hammer coral" ***Synonyms –*** *Euphyllia paraancora* ***Notes –*** *Fimbriaphyllia paraancora* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*. While harvest rates (number of pieces) for this species have increased, the workshop did not consider this to be a significant area of concern. The market demand for *F. paraancora* is lower than other species due to the prevalence of the brown and green (low desirability) colour variants. The workshop further noted that *F. paraancora* is more prevalent in northern waters meaning harvest levels will vary across the QCF. The taxonomy of this species may also require further review and assessment. The working hypothesis being that *F. paraancora* on the GBR may be a different species. From a risk assessment perspective, the risk profile for *F. paraancora* had several data deficiencies which increased the level of uncertainty. Due to this uncertainty, the default *consequence* score was applied to this species. However, the species was assigned a lower *likelihood* score due to its overall (low) marketability and anecdotal evidence suggesting regional declines are unlikely. **The dynamics of the *F. paraancora* risk profile did not change between assessment cycles. The low-risk rating for this species was retained for the 2022 assessment.** ***Note—****F. paraancora is one of a small number of species that cannot be imported to the United Kingdom and European Union. These international bans were recognised in the workshop but were not viewed as sufficient grounds to assign D. axifuga with a rating above 'low'.*			

1.16 *Goniopora stokesi*

***Goniopora stokesi* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	*Not assessed*	*Not assessed*	*Not assessed*
2022 Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name *– "Anemone coral", "Flowerpot coral"* ***Synonyms*** *– N/A* ***Notes –*** There is limited information on how extensively *Goniopora stokesi* is harvested within the QCF. Catch data records are restricted to the genus level (*Goniopora spp*.) and there is no			

Goniopora stokesi – ERA Summary
information on the composition of this subgroup. Harvest rates for the *Goniopora* spp. complex have increased since the last assessment (2013 = ~6,800 pieces, 2018/19 – 2020/21 = ~26,000–29,000 pieces) Feedback from the QCF ERA workshop suggests that the *G. stokesi* is an inter-reef species that is more prevalent in northern waters. While difficult to quantify, anecdotal evidence suggests that the species may display a degree of site fidelity as it can be observed (regionally) in high abundance. As with other species, the *G. stokesi* harvest will concentrate on more marketable colour morphs with brown variants viewed as less desirable. While further insight was provided on the structure of the *G. stokesi* harvest, it was difficult to ascertain the level of risk posed to this species and/or assign risk ratings to both parameters *i.e. consequence* and *likelihood*. Under the revised criteria, a default conservative score of 'Severe' (3) could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component was more difficult. The primary obstruction being that all the catch data for this subgroup was at the genus level. This limits the extent of any species-specific comparisons and provides limited insight into how intensively *G. stokesi* is harvested at a regional and fishery-wide level. **Due to the above deficiencies, the workshop supported delaying the risk assessment for *G. stokesi*, identifying it as a priority for subsequent ERAs.** This delay will provide the QCF with more time to gather additional information (*e.g.* through the logbooks) and facilitate a more accurate appraisal of the risk posed to this species.

1.17 Heteractis magnifica

Heteractis magnifica – ERA Summary			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3	1	3
2022 Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name – *"Magnificent Sea anemone"* ***Synonyms*** – *N/A* ***Notes*** – The catalyst behind *H. magnifica* being considered for inclusion in the updated ERA was its classification as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*. *Heteractis magnifica* was one of small number of species where the coral ERA workshop recommended that the assessment be delayed. As harvest-rate data for *H. magnifica* is not available, any workshop assessment would be based on data compiled at the genus level; noting that *H. magnifica* has previously been classified as part of the *Heteractis* spp. complex. This data shows that the complex is taken in very small quantities; <100 pieces per year. Deficiencies in the harvest data makes it difficult to assign risk ratings to both parameters *i.e. consequence* and *likelihood*. Under the revised criteria, a default conservative score of 'Severe' (3)			

Heteractis magnifica – ERA Summary
could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component would be more difficult as there is (currently) limited understanding of a) how extensively *H. magnifica* is harvested in the QCF and b) the contribution it makes to the total QCF harvest. This limits the extent of any species-specific comparisons and provides limited insight into the level of risk posed to this species. **When and where appropriate, *H. magnifica* will be considered for inclusion in subsequent ERAs involving the QCF. The ability to assess this species will be dependent on the available data.**

1.18 Homophyllia cf. australis

***Homophyllia cf. australis* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3	4	12
2022 Update	4	5	20
Comments/Feedback (2022 ERA)			
Common Name – *"*Doughnut coral", "Button coral", "sea button coral", "cat's eye coral" ***Synonyms –*** *Scolymia australis, Parascolymia australis* ***Notes –*** *Homophyllia cf. australis* was included in Phase 1 of the QCF ERA update as it is classified as a *Tier 1* species under the *Coral Fishery Harvest Strategy 2021–2026* and listed in Attachment B of the WTO approval. Harvest rates (number of pieces) for this species have increased through time and it is considered a notable area of concern. Taxonomic evidence suggests that *H. cf. australis* has a restricted distribution and is only found in a small area of the Great Barrier Reef (near Mackay). These constraints make *H. cf. australis* more susceptible to over-harvesting. This risk would be most applicable to brightly coloured variants which are more marketable and are harvested with more regularity. Brown and grey colour morphs tend not to be targeted or, if retained, are harvested in lower quantities. *Homophyllia cf. australis* has an increased potential to experience a major consequence because of overharvesting. The extent of this consequence is significant and may impact the long-term conservation status of the species. This inference is supported by fisheries independent research which suggests that elevated harvest rates have increased the likelihood of regional declines. These concerns were reflected in workshop discussions with participants supporting an increase in the *consequence* score. A corresponding increase in the *likelihood* score was also supported. **The dynamics of the *H. cf. australis* risk profile has changed since the last assessment. Amendments to the *consequence* and *likelihood* score increased the risk score from 12 (2013) to 20 (2022). This change was sufficient to shift the species from a rating of 'moderate' to 'extreme'.**			

1.19 Homophyllia bowerbanki

***Homophyllia bowerbanki* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3	3	9
2022 Update	2	3	6
Comments/Feedback (2022 ERA)			
Common Name – *"Starry cup coral"* ***Synonyms –*** *Acanthastrea bowerbanki* ***Notes –*** *Homophyllia bowerbanki* was included in the Phase 1 of the QCF ERA update as it was classified as moderate risk in the 2013 ERA. While harvest rates (number of pieces) have increased for this species, it was not identified as a significant or substantial area of concern. Industry representatives indicate that *H. bowerbanki* is harvested opportunistically *i.e.* only picked up when it is seen in a desirable colour morph *versus* being actively sort out and targeted. It was further noted that most colour morphs exhibited in this species are not marketable / less desirable. Considering the above factors, the workshop recommended that the *consequence* score be reduced. The premise being that the long-term impact on regional populations will be smaller/minimal over the next 10 years. The workshop also noted that the market demand for *H. bowerbanki* is not expected to change significantly over this time. **The dynamics of the *H. bowerbanki* risk profile has changed since the last assessment. A downgrading of the *consequence* score was reflected in the final rating (2013 = 9, 2022 = 6) with the species assessed as a low risk (down from moderate).**			

1.20 Lobophyllia hemprichii

***Lobophyllia hemprichii* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	*Not assessed*	*Not assessed*	*Not assessed*
2022 Update	3 (default score)	Could not be assessed	Not determined / Insufficient data.
Comments/Feedback (2022 ERA)			
Common Name *– "Lobed brain coral"* ***Synonyms*** *– N/A* ***Notes*** *– Lobophyllia hemprichii* was one of small number of species where the coral ERA workshop recommended that the assessment be delayed. As harvest-rate data for *L. hemprichii* is not available, any workshop assessment would be based on data compiled at the genus level. This data shows that harvest rates for the *Lobophylliidae* spp. complex have increased from around 9800 pieces in 2013 to over 20 000 pieces.			

***Lobophyllia hemprichii* – ERA Summary**
Deficiencies in the harvest data makes it difficult to assign risk ratings to both parameters *i.e. consequence* and *likelihood*. Under the revised criteria, a default conservative score of 'Severe' (3) could have been assigned to the *consequence* component. Assigning a risk assessment score to the *likelihood* component would be more difficult as there is (currently) limited understanding of a) how extensively *L. hemprichii* is harvested in the QCF and b) the contribution it makes to the total QCF harvest. This limits the extent of any species-specific comparisons and provides limited insight into the level of risk posed to this species. These issues are complicated by the fact that this complex would include catch data for species now excluded from the *Lobophyllia* complex *e.g. Acanthastrea pachysepta.* **When and where appropriate, *L. hemprichii* will be considered for inclusion in subsequent ERAs involving the QCF. The ability to assess this species will be dependent on the available data.**

1.21 Micromussa lordhowensis

***Micromussa lordhowensis* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Keppel, 3 – Other	2 – Keppel, 2 – Other	6 – Keppel, 6 – Other
2022 Update	4	5	20
Comments/Feedback (2022 ERA)			
Common Name – *"Starry cup coral", "Acan"* ***Synonyms –*** *Acanthastrea lordhowensis* ***Notes –*** *Micromussa lordhowensis* was included in the Phase 1 of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026* and listed in Attachment B of the WTO approval. Catch data shows that the harvest (number of pieces) of this species has increased from 12 030 pieces in 2011/12 to 50 521 pieces in 2020/21. This increase in catch was of identified as a notable concern and reflected in the final risk rating. Feedback indicated that *M. lordhowensis* is highly susceptible to heat stress and its distribution is restricted the southern Great Barrier Reef and towards the south pacific. There is some debate on its distribution, though this could be due to taxonomic discrepancies. Harvest is highly selective with desirable colour morphs targeted with more frequency. However, there is an increased probability that *M. lordhowensis* will experience localised depletions over the next ten years if the current management regime was retained. At the workshop, the consensus was to increase the *consequence* score for *M. lordhowensis* due to its limited distribution, susceptibility to heat stress and mortality after collection. Without management reforms this consequence is expected to occur moderately hence the *likelihood* score was also increased. **Based on the information provided, the dynamics of the *M. lordhowensis* risk profile has changed the risk score significantly, from 'low' to 'extreme' risk.**			

1.22 Trachyphyllia geoffroyi

***Trachyphyllia geoffroyi* – ERA Summary**			
	Consequence	***Likelihood***	***Risk Rating***
2013 ERA Rating	3 – Cairns, 1 – Keppel, 2 – Other	3 – Cairns, 1 – Keppel, 1 – Other	9 – Cairns, 1 – Keppel 2 – Other
S2022 ERA Update	4	4	16
Comments/Feedback (2022 ERA)			

Common Name – "Open brain coral"

Synonyms – *N/A*

Notes – *Trachyphyllia geoffroyi* was included in the first phase of the QCF ERA update as it is classified as a *Tier 2* species under the *Coral Fishery Harvest Strategy 2021–2026*.

Harvest rates (number of species) have increased for this species and the workshop considered it an area of concern. Feedback from the workshop indicated that *T. geoffroyi* is a widespread, slow growing species that displays regional variation. As with several other species, colour morphs are the key driver behind their marketability. This by extension means that a portion of the regional population (*i.e.* dull colour morphs) are not harvested in great quantities.

Taxonomically, *T. geoffroyi* is easily identifiable, suggesting catch data for this species is accurate. *Trachyphyllia geoffroyi* is more prolific in the northern regions where colonies are dense. Southern colonies are more dispersed but can be found in higher densities. However, intra-specific variability and a preference for inter-reef habitat can make it more difficult to estimate regional abundance.

Workshop participants supported the decision to increase both the *consequence* and *likelihood* scores. This decision was justified due to observed increases in the catch rate and an increased risk of regional depletion. Uncertainty regarding the distribution and abundance of southern colonies were also key contributors in terms of assigning this species a higher risk rating.

The dynamics of the *T. geoffroyi* risk profile has changed with the species registering a higher overall score (2013 = 9 max; 2022 = 16). This change was sufficient to shift the species from a 'low' to 'high' risk rating. It is important to note that a high-risk rating could potentially be precautionary for this species and the risk profile of *T. geoffroyi* may need to be reviewed when the new management regime comes into effect.