

A vulnerability assessment of coral taxa collected in the Queensland Coral Fishery

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Anthony Roelofs & Rebecca Silcock
Department of Primary Industries and Fisheries

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Front cover: Staghorn coral at Elford Reef, Queensland (photograph courtesy of Anthony Roelofs).

INTRODUCTION

This assessment provides a simple flexible structure for conducting and evaluating coral species vulnerability within the Queensland Coral Fishery (QCF). By quantifying the factors that influence a species vulnerability to harvesting by the fishery, specific management measures to mitigate fishing impacts can be developed for those coral species evaluated at medium to high risk. The vulnerability assessment has been designed as a pre-assessment tool for a subsequent ecological risk assessment of the QCF. The vulnerability assessment will identify the key issues and species in the QCF. These will be later assigned levels of ecological risk by a working group consisting of industry members, scientific experts, and fisheries management and conservation agency representatives

The framework for this study is conceptually similar to the approach taken by Ponder and Grayson (Ponder & Grayson 1998) for assessing risk in Marine gastropods to collection activities and builds on methods developed for the Queensland Marine Aquarium Fish Fishery (MAFF) (Roelofs & Silcock 2008). The assessment utilises a defined set of ecological values regarding distribution & accessibility, ecological niches and susceptibility to natural disturbances (e.g., coral bleaching) to determine each species level of vulnerability risk.

Fishery background

The QCF is a small scale, quota managed, hand harvest fishery (commercial Total Allowable Catch = 200 tonnes) with 31 licence holders (59 authorities). About 94 tonnes comprising hard and soft corals (33%) and living rock (67%) were harvested during the 2006–2007 season.

Fishery area

The commercial coral fishery area includes tidal waters along Queensland's east coast between the tip of Cape York and the Queensland-New South Wales border (Figure 1).

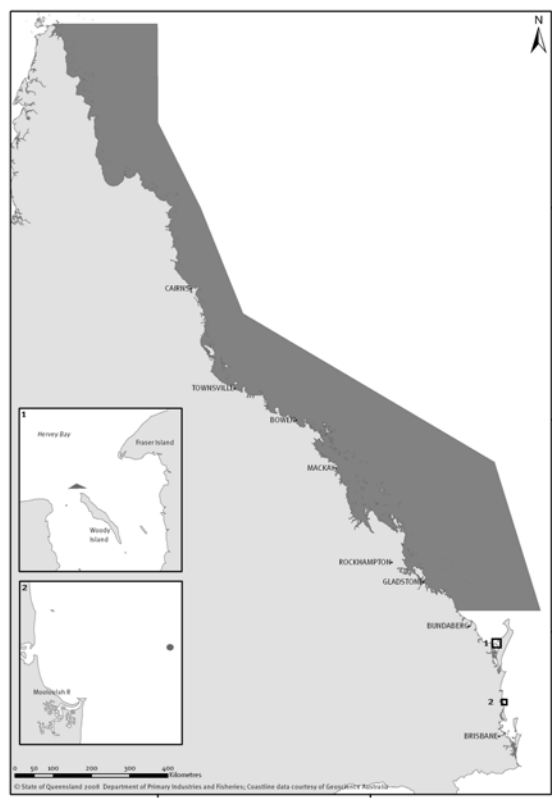


Figure 1. Map of the Queensland Coral Fishery

Commercial coral harvesters can harvest from all tidal waters (under Queensland jurisdiction) extending from the tip of Cape York to the southern extent of the Great Barrier Reef Marine Park (GBRMP) at a latitude of 24 degrees 30 minutes south (so long as they are open to coral harvesting under GBRMP Zoning). This is referred to as "roving harvest". Two small areas south of the GBRMP are open to harvesting under specific licences.

Main target species

The commercial Coral Fishery is based on the collection of a broad range of species from the classes Anthozoa and Hydrozoa. The key components of the fishery are:

- Live corals (includes anemones, soft and hard corals)
- Ornamental (non-living) corals
- Living rock (i.e. dead coral skeletons with algae and other organisms living on them)
- Coral rubble (i.e. coarsely broken up coral fragments)
- Coral sand (i.e. finely ground up particles of coral skeleton) - only taken as incidental catch and may not be targeted within Marine Park waters

Due to the strong market demand for live corals for use in private aquaria, key target species are generally the small and vibrant varieties of coral. Live rock is also a major component of the fishery, due to its suitability as

a substrate for the smaller, brighter corals in aquarium tanks. Anemones (Order Actinaria) are also part of the coral fishery and are a key target group.

Coral taxa from over 36 families are harvested for the live aquarium trade. Coral families targeted for the non-living, ornamental coral trade include:

- Pocilloporodae (cauliflower/bird's nest corals)
- Acroporidae (staghorn/velvet corals)

Gear

Coral may only be taken by hand or by using hand-held non-mechanical implements, such as a hammer and chisel. Licence holders may also use underwater breathing apparatus (SCUBA or hookah) when taking coral. Where a chisel is used, divers endeavour to remove only the coral itself, taking great care to minimise the amount of substrate that is taken or damaged. These removal methods reduce freight costs (less weight and volume) and also limit the environmental footprint of their harvesting.

Marketing

The coral fishery focuses on the collection of coral specimens for commercial and private marine aquariums and to supply a small trade in decorative souvenirs and ornaments. Currently more than 80 per cent of all coral harvested goes into the aquarium trade. Although a significant Australian industry, the QCF is not considered one of the major exporters of hard and soft corals and living rock on the world scale (Wabnitz et al. 2003). Given the size of harvest relative to the resource and the quota control of coral amounts being harvested, Queensland's coral fishery is one of the lowest impact coral fisheries on an international level. The emphasis of the fishery is on quality rather than quantity, which contributes to both the ecological and economic sustainability of the fishery.

Management arrangements

Commercial fishery

From 1 July 2006 the commercial coral fishery operated under the DPI&F "Policy for the Management of the Coral Fishery". This Policy introduced several major changes to the operation and management of the fishery:

- Roving harvest for all licence holders, in place of individual Coral Collection Areas (CCAs)
- Removal of the inappropriate 6m depth limit to allow collection in ideal habitats
- Capping the take of live coral at 30% of the commercial fishery's Total Allowable Catch (TACC), which remains at 200 tonnes
- Reporting of catch prior to landing
- More detailed logbook reporting

Additionally, the following management measures are still in place for the commercial fishery under legislation and policy:

- Limited entry: 59 Commercial Harvest Fishery Licences (CHFLs) are endorsed for the coral fishery.
- Limits on the number of boats and collectors operating under a licence at any one time.
- Collection by hand or hand-held implements only, with the aid of artificial breathing apparatus allowed.

Recreational fishery

- No selling or trading of catch.
- No use of underwater breathing apparatus (i.e. SCUBA or hookah), other than a snorkel.
- No collection in State Marine Parks and the GBRMP.

METHODS

We ranked 99 coral and anemone genera for aspects of their biology and ecology likely to render them vulnerable to harvesting activities carried out in the QCF. The taxa list was collated using stock lists provided by a selection of QCF & MAFF operators ranging from the south, central and north regions of the fishery. The taxa list therefore does not represent the entire suite of species that potentially may be collected (about 400 species in the GBR); however it comprehensively represents those that are presently collected. It also should be noted that the genera and species names provided are based on those used by industry. Industry participants are skilled in identification but are not generally trained as taxonomists. This may introduce a source of taxonomic inaccuracy but using names provided by industry was the more consistent approach.

A database was created in Microsoft Access® to store information related to the ranking criteria for each of the 99 coral and anemone genera considered in this study. The overall vulnerability risk for each coral taxa was determined by the average of the rankings across all criteria.

Vulnerability Criteria

Criteria were developed to categorise targeted taxa in terms of environmental and ecological factors that influence their potential vulnerability to harvesting activities by the QCF. The methodology was based on the conceptual model for vulnerability risk assessment developed for specimen marine molluscs by Ponder & Grayson (1998). All vulnerability criteria were given the same weighting, indicating that each criterion were equally important in determining the overall risk. Rankings were scaled in increasing order of risk (i.e. 5 = higher level of risk).

Accessibility

1. Very limited accessibility – >60m; very deep water
2. Limited accessibility – 30–60m; specialist diving
3. Accessible – 10–30m; diving only (limited by dive tables)
4. Readily accessible – 5–10m; diving (no limits)
5. Readily accessible – 0–5m; free diving

Due to the nature of coral collection, divers are restricted to the same diving safety standards that they face when collecting fish species; making the level of effort that can potentially be applied similar to that of the Queensland Marine Aquarium Fish Fishery (Roelofs & Silcock in prep).

The QCF is based on hand collection by divers and therefore the amount of harvest effort is mostly limited by time and depth, although the type and location of collection habitat, weather conditions, turbid water and strong tidal currents also influence the amount of effort in some cases. 'Accessibility' refers to the level of effort that can be potentially applied to the collection of coral species. Consequently shallow waters can receive more effort than deep water habitats because of increased dive times, increasing the vulnerability/exposure of shallow water species to collection (i.e., no time limits for free diving, very long dive periods for shallow water (5–10m) SCUBA or hookah diving). Corals that are distributed predominantly below 30 metres (beyond safe dive depths) are considered to be at lower risk from over collection. Below 30 metres however we do make one distinction with 'Limited accessibility' referring to specialist diving activities using mixed gases and re-breathers which allows greater lengths of dive and therefore access to fish populations at depths to 60 metres. Only one QCF operator has experimented with this diving capacity. Where a species occurred over a range of depths or accessibility criteria (not including species that are difficult to capture), each category was recorded and an average taken for the overall ranking.

Habitat/Ecological niche

2. Generalist—wide range of habitats and depth preferences; colonizing species
4. Specialist—taxa have a limited or defined niche

The generalist category recognises these species are less vulnerable due to their wide range of niches they associate with. This may provide refugia from fishery and climatic impacts which in turn could provide a

source of recruitment. The specialist category recognises that some species are more vulnerable because the niches they occupy are restricted in some way and/or the species have developed specialised behaviours/modifications to occupy particular niche habitats. These taxa are likely to be affected by limited recruitment if local populations are removed through concentrated harvesting or destroyed by catastrophic climate and weather events. Specialist coral taxa are considered more vulnerable to over collection than generalist taxa.

Distribution

1. Widespread–found widely throughout the Indo-Pacific. Very few spatial restrictions to distribution.
2. Spread–found widely throughout the West Pacific
3. Restricted locally–Spread throughout the West Pacific but maybe locally less abundant
4. Restricted–found within the QCF area and limited distribution elsewhere in Australian waters
5. Very restricted–Found only in a small area within the QCF area and not elsewhere unless near the fishery boundary and the species has a restricted distribution on the other side of that boundary e.g. Coral Sea reefs, New South Wales.

A coral species ability to sustain heavy collection pressure and localised depletion is likely related to its potential to repopulate and recolonise. We consider that coral species with widespread distributions are more resilient to harvesting pressures than spatially restricted or endemic species. This is due to their success at occupying a broader range of habitats and their greater ability to repopulate from areas beyond the collection sites.

Susceptibility to bleaching

2. Low
3. Moderate
4. High
5. Severe

A key consideration in the overall vulnerability of corals is their susceptibility to bleaching events associated with global warming. The susceptibility to bleaching criteria was adopted from Marshall and Baird (2000). Bleaching may result from high or low water temperatures, excessive ultraviolet radiation, aerial exposure, reduced salinity, high sedimentation, pollutants, or toxins (Glynn 1991; Hoegh-Guldberg & Salvat 1995; Brown 1997; Hoegh-Guldberg 1999). The response to these impacts is varied however and is not always fatal for the coral host. Coral bleaching has been interpreted as an adaptation for survival (Baker 2001). Sudden exposure to increased irradiance after upward transplantation of corals from depths can lead to adaptive changes in symbiont communities. Baker (2001) found that some reef corals have flexible associations that can switch or shuffle symbiont communities in response to environmental change.

Abundance

1. Very common
2. Common
3. Moderately common
4. Uncommon
5. Rare

The abundance of each collected coral and anemone genera is a key element in their overall vulnerability. It is likely that the more abundant a species is, then the more collection pressure the population is likely able to tolerate. And the reverse is true as well. We have determined the ranking for each genera from the literature however 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 traditionally surveyed. There are therefore gaps in our knowledge on the distributions of many coral species at present. There are studies that are seeking answers for deep water and inter reef areas in the GBR such as the CSIRO Seabed Biodiversity Project and indeed the coral collection industry are forever broadening our knowledge of

the distributions of coral species by experimenting with deep diving techniques. Results from the Seabed Biodiversity Project so far have indicated that there are significant inter reefal areas of hard and soft corals as well as gorgonians.

Structure of the database

TAXA: Order, Family, Genus, Species, Common name, List of synonyms

VULNERABILITY INFORMATION:

Distribution & Abundance: Very restricted, restricted, restricted locally, spread, widespread.

Accessibility: Readily accessible via free diving (0–5m), readily accessible (5–10m), accessible by diving only (10–30m), limited accessibility (30–60m), very limited accessibility (>80m)

Habitat/Ecological niche: Shallow water species (<10m), Restricted, areas of low water movement; Restricted, areas of current and wave action; Generalist, wide range of habitats.

Susceptibility to bleaching: Severe, high, moderate, low

DISTRIBUTION & ABUNDANCE: The geographical distribution of each of the genera covered within the vulnerability assessment is given in general terms. Genera are categorised into four main areas. Widespread, found widely throughout the Indo-pacific region comprising of the Indian and Pacific Oceans from the coast of East Africa to the easternmost islands of Oceania. Spread, encompassing the Western Pacific region ranging from southern Japan through the Philippines, Indonesia, and the islands of Melanesia to the Great Barrier Reef. Restricted locally, Spread throughout the Western Pacific however has the potential to be locally rare. Restricted refers to species found within the CCF area, however may also exhibit a limited distribution elsewhere in Australia. Very restricted refers to the species distribution being confined to the CCF area perhaps specific reef(s).

HABITAT: Information about the habitat in which the species is found, including the type of substrata and depth of water. Depth range is given in metres (m) for each of the genera listed within the sustainability assessment. Where genera occurred over a range of depths, each category was recorded and an average taken for the overall ranking.

Habitat types cover a broad range of categories, sandy bottoms, deep water, reef slopes, channels, lagoons, seaward reefs, caves, ledges, drop-offs, as well as the reliance on water flow, wave action and protection.

RESULTS

Vulnerability risk categories are shown in Table 1. We ranked 99 coral and anemone taxa for their vulnerability risks (Table 2). No taxa or taxonomic groups collected in the fishery possessed characteristics that when combined, defined it as highly vulnerable (Table 2). Three genera of soft coral and one genera of reef building coral were considered to be at moderate risk. The remaining genera were all considered to be a low vulnerability risk.

Table 1: Vulnerability risk categories for coral taxa collected in the Queensland Coral Fishery

Vulnerability Risk	Average score from criteria	Description
Very Low	<2	These taxa are not vulnerable to harvesting activity in the QCF.
Low	2–2.99	These taxa are at low risk from QCF harvesting activity.
Medium	3–3.99	These taxa have characteristics that make them moderately vulnerable to over harvesting by the fishery.
High	4–5	These taxa have characteristics that make them highly vulnerable to over harvesting by the fishery.

Table 2. Vulnerability rankings for coral taxa harvested in the Queensland Coral Fishery (taxa in orange are moderately vulnerable). (LC = Live Coral; OC = Ornamental Coral).

Logbook name	Order	Family	Genus	Species	Common name	Dist	Eco-niche	Bleaching	Access	Abundance	VAR
Anemones											
LC	Actiniaria	Actiniidae	<i>Actinia</i>	<i>tenebrosa</i>	Waratah Anemone	2	4	1	5	2	2.8
LC	Actiniaria	Actiniidae	<i>Entacmaea</i>	<i>quadricolor</i>	Bubble tip anemone	1	2	4	3.5	2	2.5
LC	Actiniaria	Stichodactylidae	<i>Heteractis</i>	<i>aurora</i>	Beaded sea anemone	1	2	3	3	2	2.2
LC	Actiniaria	Stichodactylidae	<i>Heteractis</i>	<i>crispa</i>	Leathery sea anemone	1	2	3	3	2	2.2
LC	Actiniaria	Stichodactylidae	<i>Heteractis</i>	<i>magnifica</i>	Magnificent sea anemone	1	2	3	3.5	2	2.3
LC	Actiniaria	Stichodactylidae	<i>Stichodactyla</i>	<i>gigantea</i>	Gigantic sea anemone	1	2	3	2.5	2	2.1
LC	Actiniaria	Stichodactylidae	<i>Stichodactyla</i>	<i>haddonii</i>	Haddon's sea anemone	2	2	3	2.5	2	2.3
LC	Actiniaria	Stichodactylidae	<i>Stichodactyla</i>	<i>mertensii</i>	Mertens' sea anemone	2	2	3	3.5	2	2.5
Soft corals											
LC	Alcyonacea	Alcyoniidae	<i>Cladiella</i>		Leather Corals	1	2	4	4	2	2.6
LC	Alcyonacea	Alcyoniidae	<i>Klyxum</i>		Leather Corals	1	2	4	3	3	2.6
LC	Alcyonacea	Alcyoniidae	<i>Lobophytum</i>		Leather corals	1	2	4	4	2	2.6
LC	Alcyonacea	Alcyoniidae	<i>Paraminabea</i>		Soft coral	1	2	2	3	5	2.6
LC	Alcyonacea	Alcyoniidae	<i>Rhytisma</i>		Soft coral	1	2	4	3	4	2.8
LC	Alcyonacea	Alcyoniidae	<i>Sarcophyton</i>		Leather corals	1	2	4	3	1	2.2
LC	Alcyonacea	Alcyoniidae	<i>Sinularia</i>		Leather Corals	1	2	4	3.5	2	2.5
LC	Alcyonacea	Briareidae	<i>Briareum</i>		Star Polyps	1	2	4	3	2	2.4
LC	Alcyonacea	Briareidae	<i>Pachyclavularia</i>		Star polyps	1	4	4	3	2	2.8
LC	Alcyonacea	Clavulariidae	<i>Carijoa</i>		Soft coral	1	2	2	3	4	2.4
LC	Alcyonacea	Clavulariidae	<i>Clavularia</i>		Waving hand	1	2	4	5	2	2.8
LC	Alcyonacea	Corallimorphidae	<i>Discosoma</i>		Hexacoral	1	2	2	4	2	2.2
LC	Alcyonacea	Ellisellidae	<i>Ctenocella</i>		Whip coral	1	2	2	3	2	2
LC	Alcyonacea	Ellisellidae	<i>Ellisella</i>		Deepwater gorgonia,	1	4	2	2	2	2.2
LC	Alcyonacea	Gorgoniidae	<i>Various</i>		Gorgonians	1	4	2	3.5	5	3.1
LC	Alcyonacea	Helioporidae	<i>Helioporidae</i>	<i>coerulea</i>	Blue coral	1	2	3	3	2	2.2
LC	Alcyonacea	Melithaeidae	<i>Melithaea</i>		Gorgonian coral	1	2	2	3	3	2.2
LC	Alcyonacea	Nephtheidae	<i>Capnella</i>		Soft coral	1	2	3	3	2	2.2
LC	Alcyonacea	Nephtheidae	<i>Dendronephthya</i>		Cauliflower corals	1	4	2	2.5	3	2.5
LC	Alcyonacea	Nephtheidae	<i>Lemnalia</i>		Soft coral	1	2	3	3	2	2.2
LC	Alcyonacea	Nephtheidae	<i>Litophyton</i>		Nephthea coral	3	2	2	4	5	3.2
LC	Alcyonacea	Nephtheidae	<i>Nephthea</i>		Soft coral	1	2	3	3.5	2	2.3
LC	Alcyonacea	Nephtheidae	<i>Paralemnalia</i>		Soft coral	1	2	3	3	2	2.2
LC	Alcyonacea	Nephtheidae	<i>Scleronephthya</i>		Cauliflower corals,	1	4	2	2.5	4	2.7
LC	Alcyonacea	Nephtheidae	<i>Stereonephthya</i>		Golden soft coral	1	2	2	2.5	4	2.3

Logbook name	Order	Family	Genus	Species	Common name	Dist	Eco-niche	Bleaching	Access	Abundance	VAR
LC	Alcyonacea	Nidaliidae	<i>Siphonogorgia</i>		Soft coral	1	4	2	2.5	4	2.7
LC	Alcyonacea	Tubiporidae	<i>Tubipora</i>		Organ pipe coral	1	4	4	3	2	2.8
LC	Alcyonacea	Xeniidae	<i>Anthelia</i>		Waving Hand Coral	1	2	2	3	2	2
LC	Alcyonacea	Xeniidae	<i>Asterospicularia</i>			1	2	2	4	2	2.2
LC	Alcyonacea	Xeniidae	<i>Cespitularia</i>		Waving Hand Coral	1	2	2	3	2	2
LC	Alcyonacea	Xeniidae	<i>Efflatounaria</i>		Waving Hand Coral	3	4	2	3.5	3	3.1
LC	Alcyonacea	Xeniidae	<i>Sympodium</i>			1	2	2	3	2	2
LC	Alcyonacea	Xeniidae	<i>Xenia sp.1</i>		Pulse coral	1	2	2	3.5	2	2.1
LC	Alcyonacea	Xeniidae	<i>Xenia sp.2</i>		Waving Hand Coral	1	2	2	3	2	2
LC	Alcyonacea	Zoanthidae	<i>Palythoa</i>		Champagne cups	1	2	2	3	2	2
Hard corals											
OC	Scleractinia	Acroporidae	<i>Acropora</i>		Staghorn coral	1	2	5	4	2	2.8
LC	Scleractinia	Acroporidae	<i>Montipora</i>		Velvet coral	1	4	5	4	2	3.2
LC	Scleractinia	Caryophyllidae	<i>Catalaphyllia</i>	<i>jardinei</i>	Elegance coral	1	4	2	3	3	2.6
LC	Scleractinia	Caryophyllidae	<i>Euphyllia</i>	<i>glabrescens</i>	Torch coral	1	2	2	3	3	2.2
LC	Scleractinia	Caryophyllidae	<i>Euphyllia</i>		Branching hammer coral	1	2	2	3	4	2.4
LC	Scleractinia	Caryophyllidae	<i>Physogyra</i>		Bubble coral	1	2	2	4	2	2.2
LC	Scleractinia	Caryophyllidae	<i>Plerogyra</i>		Bubble coral	1	4	2	3.5	4	2.9
LC	Scleractinia	Dendrophyllidae	<i>Dendrophyllia</i>		Cup corals	2	2	2	2.5	4	2.5
LC	Scleractinia	Dendrophyllidae	<i>Duncanopsammia</i>	<i>axifuga</i>	Whisker coral	3	2	2	2.5	4	2.7
LC	Scleractinia	Dendrophyllidae	<i>Tubastrea</i>		Daisy coral	1	2	2	3	2	2
LC	Scleractinia	Dendrophyllidae	<i>Turbinaria</i>		Cup coral	1	2	2	4	2	2.2
LC	Scleractinia	Dendrophyllidae	<i>Balanophyllia</i>		Flower coral	3	2	2	3	4	2.8
LC	Scleractinia	Dendrophyllidae	<i>Heteropsammia</i>		Button coral	1	4	2	3	2	2.4
LC	Scleractinia	Faviidae	<i>Caulastrea</i>		Trumpet coral	1	4	3	3.5	3	2.9
LC	Scleractinia	Faviidae	<i>Favia</i>		Moon coral	1	2	3	3	2	2.2
LC	Scleractinia	Faviidae	<i>Favites</i>		Moon coral	1	2	3	3	3	2.4
LC	Scleractinia	Faviidae	<i>Goniastrea</i>		Honeycomb coral	1	2	3	4	2	2.4
LC	Scleractinia	Faviidae	<i>Leptastrea</i>		Star coral	1	2	3	4	3	2.6
LC	Scleractinia	Faviidae	<i>Leptoria</i>		Maze coral	1	2	3	3.5	2	2.3
LC	Scleractinia	Faviidae	<i>Montastrea</i>		Moon coral	1	2	3	3	3	2.4
LC	Scleractinia	Faviidae	<i>Moseleya</i>		Corrallimorph coral	1	2	3	3.5	4	2.7
LC	Scleractinia	Faviidae	<i>Oulophyllia</i>		Moon coral	1	2	3	3.5	3	2.5
LC	Scleractinia	Faviidae	<i>Platygyra</i>		Maze coral	1	2	3	3.5	4	2.7
LC	Scleractinia	Faviidae	<i>Plesiastrea</i>		Star coral	1	2	3	3.5	3	2.5
LC	Scleractinia	Fungidae	<i>Fungia</i>		Disk coral	1	2	2	3	3	2.2
LC	Scleractinia	Fungiidae	<i>Cycloseris</i>		Domed mushroom coral	1	4	2	2	4	2.6

Logbook name	Order	Family	Genus	Species	Common name	Dist	Eco-niche	Bleaching	Access	Abundance	VAR
LC	Scleractinia	Fungiidae	<i>Diaseris</i>		Diaseris	1	4	2	4	2	2.6
LC	Scleractinia	Fungiidae	<i>Heliofungia</i>		Tentacled mushroom	1	2	2	4	2	2.2
LC	Scleractinia	Fungiidae	<i>Polyphyllia</i>		Slipper coral	1	2	2	3.5	2	2.1
LC	Scleractinia	Merulinidae	<i>Hydnophora</i>	<i>actinoformis</i>	Carpet coral	1	2	4	3.5	3	2.7
LC	Scleractinia	Merulinidae	<i>Merulina</i>		Ruffled coral	1	2	2	3.5	2	2.1
LC	Scleractinia	Mussidae	<i>Acanthastrea</i>		Starry cup coral	1	2	2	4	4	2.6
LC	Scleractinia	Mussidae	<i>Blastomussa</i>		Pineapple coral	1	2	2	4	4	2.6
LC	Scleractinia	Mussidae	<i>Cynarina</i>		Button coral	1	2	2	2	4	2.2
LC	Scleractinia	Mussidae	<i>Micromussa</i>		Micromussa	1	2	2	4	5	2.8
LC	Scleractinia	Mussidae	<i>Mussa</i>		Spiny flower coral	1	2	2	3	4	2.4
LC	Scleractinia	Mussidae	<i>Scolymia</i>		Donughnut coral	1	4	2	3	4	2.8
LC	Scleractinia	Mussidae	<i>Symphyllia</i>		Lobed brain coral	1	4	2	3.5	4	2.9
LC	Scleractinia	Occulinidae	<i>Galaxea</i>		Galaxy coral	1	2	2	3	2	2
LC	Scleractinia	Pectinidae	<i>Pectinia</i>		Lettuce coral	1	2	3	3	4	2.6
LC	Scleractinia	Pectiniidae	<i>Echinophyllia</i>		Encrusting coral	1	2	3	3	2	2.2
LC	Scleractinia	Pectiniidae	<i>Mycedium</i>		Elephant ears	1	2	3	3	2	2.2
OC	Scleractinia	Pocilloporidae	<i>Pocillopora</i>		Cauliflower coral	1	2	5	3.5	2	2.7
OC	Scleractinia	Pocilloporidae	<i>Seriatopora</i>		Birds nest coral	1	2	5	3	3	2.8
OC	Scleractinia	Pocilloporidae	<i>Stylophora</i>		Finger coral	1	2	5	3	2	2.6
LC	Scleractinia	Poritidae	<i>Alveopora</i>		Daisy coral	1	2	2	2	4	2.2
LC	Scleractinia	Poritidae	<i>Goniopora</i>		Flowerpot coral	1	2	2	3	2	2
LC	Scleractinia	Poritidae	<i>Porites</i>		Boulder coral	1	2	2	3	2	2
LC	Scleractinia	Siderastreidae	<i>Pavona</i>		Leaf coral	1	2	2	4	4	2.6
LC	Scleractinia	Stylasteridae	<i>Distichopora</i>		Miniature fan coral	1	2	2	3	4	2.4
LC	Scleractinia	Trachyphyllidae	<i>Trachyphyllia</i>	<i>geoffroyi</i>	Open brain coral	1	4	2	2.5	3	2.5
Others											
LC	Antipatharia	Antipathidae	<i>Cirripathes</i>		Black coral	1	2	2	3	2	2
LC	Halichondria	Axinellidae	<i>Phakellia</i>		Sponge	1	4	2	3.5	4	2.9
LC	Corallimorpharia	Discosomatidae	<i>Amplexidiscus</i>		Sponge	1	2	2	3	2	2
LC	Corallimorpharia	Discosomatidae	<i>Rhodactis</i>		Sponge	2	4	2	3	2	2.6
LC	Zoanthidea	Zoanthidae	<i>Various</i>		Zooanthid	1	2	2	3	2	2

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