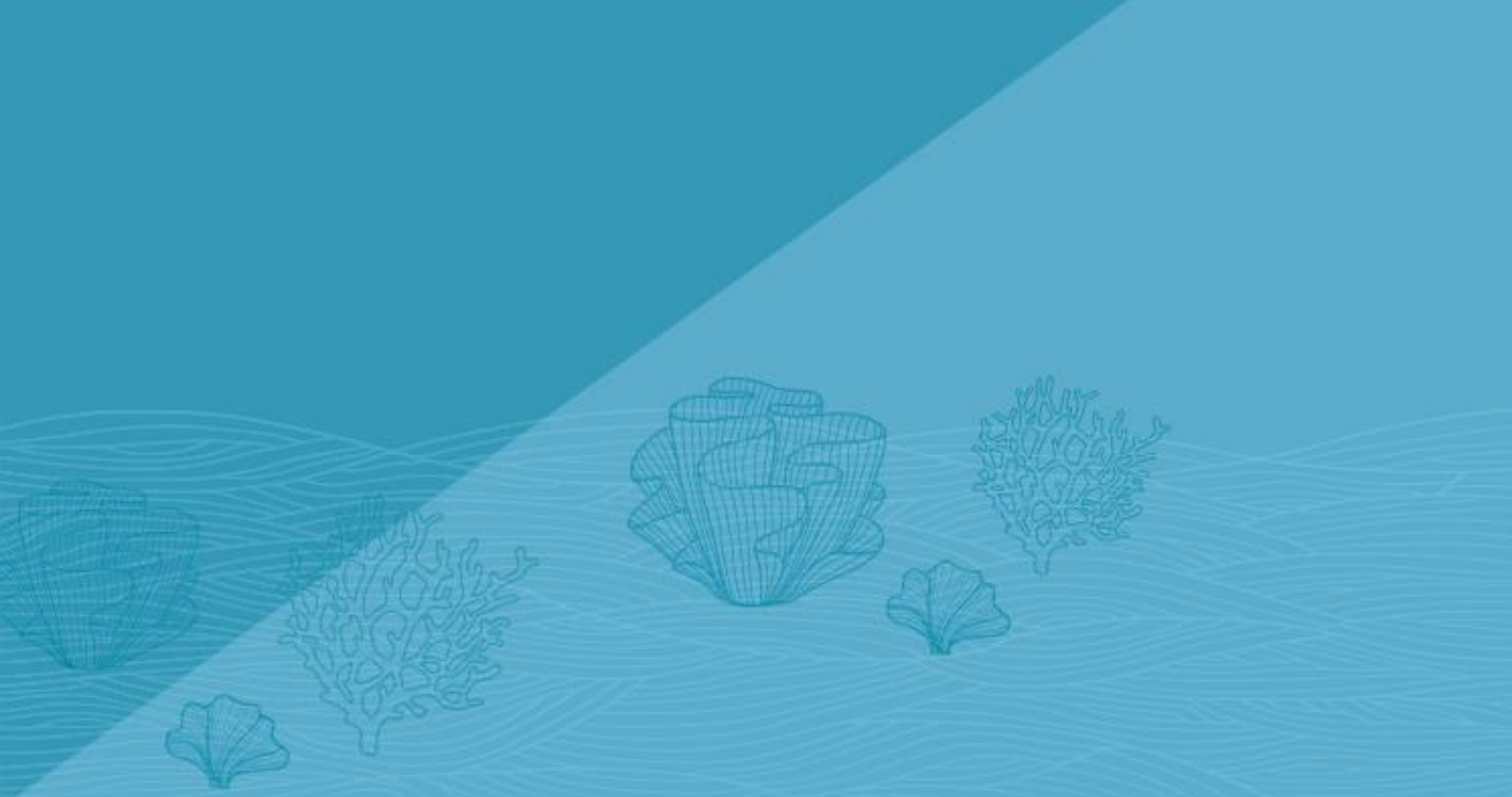


Sea cucumber fishery harvest strategy: 2021–2026

CONSULTATION DRAFT

Queensland Government

Business Unit Owner	Management & Reform
Endorsed by	Deputy Director General (Fisheries and Forestry) in accordance with delegated powers under Part 2, Division 1 (Harvest Strategies) of the *Fisheries Act 1994*
Approved by	Minister responsible for fisheries in accordance with section 16 of the *Fisheries Act 1994*

Revision history

Version no.	Approval date	Comments
1.0	September 2020	Draft harvest strategy for consultation

What the harvest strategy is trying to achieve

This harvest strategy has been developed to manage sea cucumber resources of Queensland. The sustainability risk to sea cucumber from harvesting are considered low. In addition to the substantial protection provided by marine park zoning, the hand harvesting methods used in the Queensland's Sea Cucumber Fishery (QSCF) has minimal bycatch and have negligible impacts on the broader ecosystem.

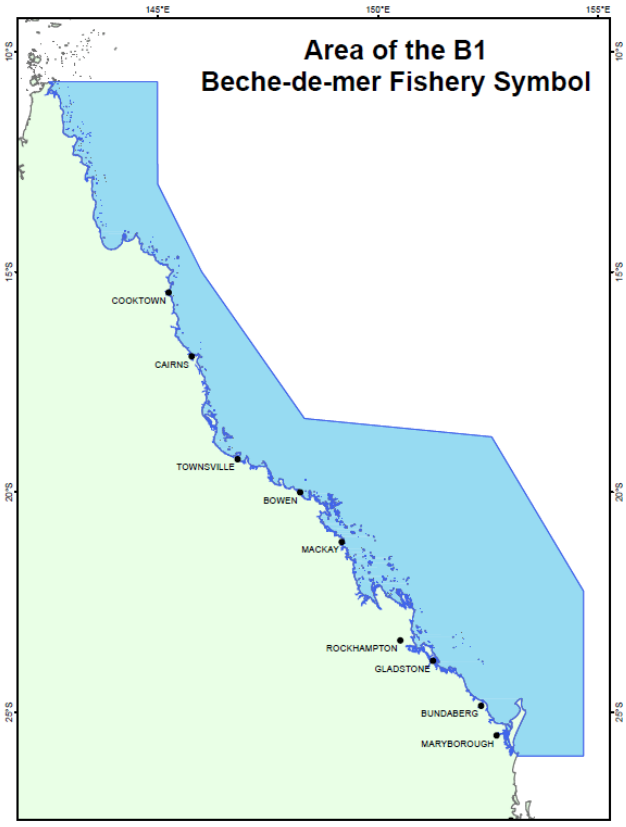
Management is currently risk-based and designed to ensure harvesting remains sustainable by monitoring harvesting trends. The harvest strategy provides for moving to assessment-based decision making through clear fishery objective, performance indicators, triggers for management action and appropriate management responses based on the status of Queensland's sea cucumber stocks.

Primary management methods for the QSCF is Individual Transferable Quotas (ITQ) for commercial fishing and in-possession limits for recreational fishing. The decision rules are designed to set catch at levels appropriate for achieving the 60% biomass target set out for sea cucumber species as well as to maintain catch shares between sectors.

Fishery overview

The QSCF is a commercial harvest fishery operating predominately within an area that encompasses the Great Barrier Reef Marine Park (GBRMP) and Marion and Saumarez Reefs. Of the fishery area 37% is permanently closed to fishing. The fishery is based on the collection of a defined list of sea cucumber species from the family Holothuridae.

The fishery is well positioned to be one of the few sustainably managed sea cucumber fisheries in the world. The commercial sector consists of a small number of quota holders targeting high and medium value sea cucumber species including white teatfish (*Holothuria fuscogilva*), black teatfish (*Holothuria whitmaei*) and burrowing blackfish (*Actinopyga spinea)*. The majority of harvested product is processed via boiling, drying or individual quick frozen and is exported.



The recreational take of sea cucumber is prohibited south of Bowen with black teatfish and white teatfish being no take species throughout Queensland waters. Due to the high value of sea cucumber and increasing pressure from domestic markets, black marketing is a risk for this fishery.

The QSCF is also an important customary activity for Aboriginal People's and Torres Strait Islanders. Traditional fishing supports personal domestic or non-commercial communal need in accordance with the particular laws and customs of the sea area being fished.

Fish stocks covered by the harvest strategy

Sea cucumber is defined in the Fisheries (General) Regulation 2019 as all species in the families Holothuriidae and Stichopodidae, and are significant members of the benthic community. Sea cucumber behaviour and biology have important effects on physico-chemical processes such as bioturbation and bioremediation in coral reef ecosystems. The management of this fishery considers the importance of sea cucumbers in marine ecosystems in order to safeguard their ecological roles. Fish stocks covered by this harvest strategy is outlined in Table 1.

Table 1: Summary of fish stocks covered by this harvest strategy

Feature	Details
Target species **(Tier 1)**	Black teatfish (*Holothuria whitmaei)* White teatfish (*Holothuria fuscogilva*) Burrowing blackfish (*Actinopyga spinea*)
Other species **(Tier 2)**	Prickly redfish (*Thelenota ananas*), Blackfish (*Actinopyga palauensis*), Currfish (*S. vastus* and *S. hermanni*), Sandfish (*Holothuria scabra*), Golden sandfish (*Holothuria scabra*), Surf redfish (*Actinopyga mauritiana*), Deep waterredfish (*Sebastes mentella*), Stonefish (*Actinopyga lecanora*), Tigerfish (*Bohadschia argus*), Greenfish (*Stichopus chloronotus*), Brown sandfish (*Bohadschia vitiensis*), Amberfish (*Thelenota anax*), Flowerfish (*Holothuria arenicola*), Lollyfish (*Holothuria atra*), Snakefish (*Holothuria coluber*), Pinkfish (*Holothuria edulis*), Elephant trunkfish (*Holothuria fuscopunctata*)
Biology	Detailed scientific information on the distribution, stock structure and ecology species to Queensland's harvested holothurian species are limited. *Estimates of biological characteristics for Tier 1 species are:* *H. fuscogilva: age of maturity = ~4 years, maximum length/age = 570mm/~12 years.* *H. whitmaei: age of maturity = ~4 years, maximum length/age = 560mm/~5-10 years.* *A. spinea: age of maturity = ~3 years, maximum length/age = 380mm/~6 years.*

Management units for this harvest strategy

Defining the fishery to which a harvest strategy will apply is a critical step in determining its scope. The management unit for this harvest strategy are as defined by the *Fisheries (Commercial Fisheries) Regulation 2019*:

- Sea Cucumber Management Area A (commercial): all tidal waters east of longitude 142º31'49'' east between latitude 10º41' south and latitude 26º south
- Sea Cucumber Management Area B (recreational): all tidal waters east of longitude 142º31'49'' east and north of latitude 10º south (near Bowen)

The QSCF is managed under a Rotational Harvest Arrangement (RHA). Reefs within the GBRMP and the Coral Sea in the fishery area are divided into 158 zones. 52 (year 1 and year 3) and 54 (year 2) zones are

made available per annum and a maximum of 18 days diving allowed per zone, per annum. Refer to Appendix 1 for details about the RHA zones.

Summary of management information

A summary of the management arrangements for the QSCF are set out in Table 2 below. Fishers should consult the relevant fisheries legislation for the latest and detailed fishery rules or visit www.fisheries.qld.gov.au.

Table 2: Summary of how the QSCF is managed

Feature	Details
Commercial fisheries symbol	Primary Commercial Fishing Licence with a "B1" fishery symbol
Relevant fisheries legislation	*Fisheries Act 1994* *Fisheries (General) and (Commercial Fisheries) Regulations 2019* *Fisheries Declaration and Fisheries Quota Declaration 2019*
Other relevant legislation	*Great Barrier Reef Marine Park Act 1975 and Regulation 2019* *Environment Protection and Biodiversity Conservation Act 1999* *Queensland Marine Parks Act 2004*
Working Group	Sea Cucumber Fishery Working Group Terms of Reference and meeting communiques are available online
Gear	The following apparatus are permitted for use: *Commercial* - Hand collection using underwater breathing apparatus. *Recreational* – Hand collection only (exc. Hookah/SCUBA).
Main management methods	*Commercial only* • Limited access • Species-specific Individual Transferable Quotas (ITQ) for black teatfish and white teatfish. • Combined ITQ for Other Species (OS) • Vessel & tender restrictions • Number of divers to take restrictions • Rotational Harvest Arrangement *Recreational only* • Possession limit of 5 and boat limit of 10 for all species, no take of black teatfish and white teatfish. • Closed waters south of Bowen and in the Gulf of Carpentaria
Fishing year	1 July – 30 June
Stock Status	White teatfish listed as '**Sustainable**' by SAFS 2018 Burrowing blackfish listed as '**Sustainable'** by SAFS 2017

	https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-compliance/data/sustainability-reporting/stock-status-assessment Australian fish stocks (SAFS) www.fish.gov.au *Note the classification system used as part of the SAFS reporting is assessed against a 20% biomass sustainability criteria. Therefore, although a species may be classified as 'sustainable' in SAFS, this does not mean that the biomass is meeting the targets set out in the Sustainable Fisheries Strategy 2017-2027.
Accreditation under the *Environment Protection and Biodiversity Conservation Act 1999*	Part 13: Accredited (expires 2025) Part 13A: Accredited (expires 2025) https://www.environment.gov.au/marine/fisheries/qld/sea-cucumber

Fishery objectives

Fishery objectives set out the direction and aspirations to achieve in the long term. The primary objective for the QSCF is to:

- Maintain all sea cucumber species at, or returned to, a target exploitable biomass level that aims to maximise economic yield (MEY) for the fishery.

While:

- Minimising and mitigating high ecological risks arising from fishing related activities.
- Maximising profitability of the commercial harvest sector.
- Maintaining the social and economic benefits of the fishery to the community.
- Ensure fisheries management is meeting the expectation of sectors and the community.

Catch shares

This harvest strategy aims to maintain the existing catch shares between sectors. The resource allocation arrangements are set out in Table 3 below to ensure that catch shares among sectors are maintained in response to changes in the Total Allowable Catch (TAC).

Aboriginal Peoples and Torres Strait Islanders traditional fishing rights are protected under native title legislation and relate to harvest for domestic, communal and non-commercial purposes. Accordingly, traditional and customary fishing is not a defined allocation.

Aboriginal Peoples and Torres Strait Islanders desire more economic opportunities through fishing, particularly in their own sea country. In line with the Indigenous Commercial Fishing Development Policy, case by case access through an Indigenous Fishing Permit, issued in accordance with section 54 of the *Fisheries (General) Regulation 2019,* may provide opportunities for communities to take part in fishing-related business.

Table 3: Resource allocation arrangements for the QSCF

Species	Commercial Fishing@	Recreational Fishing (including charter)
Sea Cucumber	99%	1%

Measuring performance of the fishery

Key indicators measure how healthy the fishery is performing. The indicators relate to the objectives, and use reference points to establish acceptable performance. The indicators measure the relative amount of fish biomass of Tier 1 stock(s) against target and other reference points. The default biomass-reference-points identified in this harvest strategy are:

- A target reference point (B*targ*) of 60% of the exploitable biomass (for Tier 1 species) being the relative biomass level the harvest strategy aims to achieve. This is also considered a proxy measure of B*mey* for the purposes of this harvest strategy;
- A limit reference point (B*lim*) of 20% of the exploitable biomass being the level that the harvest strategy aims to avoid. If the stock is assessed to be below B*lim* the risk to the stock is unacceptably high and the stock is defined as "depleted".

For Tier 1 stocks, performance indicators and sustainable harvests for all sectors will be estimated from a stock assessment. The aim is to measure the capability for the stock to attain the target biomass level (B*targ* 60%), and at which point the harvest strategy will be considered as meeting its fishery objectives.

The decision rules for setting a sustainable harvest in the Sea Cucumber Fishery Harvest Strategy are based on a 'hockey stick' approach. This is where the TAC is set based on a linear relationship between B*lim*, where the level of fishing mortality (F) is equal to zero, and B*targ* where the exploitation rate and TAC is set at the level to achieve MEY (Figure 1). The decision rule takes into account the current biomass level of the stock for determining the TAC to achieve the B*targ*. The recommended TAC is calculated by applying the rate of fishing mortality to achieve B*targ* to the current exploitable biomass level. As a result, the recommended TAC represents the total catch that can be harvested in the following years, to move the current biomass level towards the target level.

If the exploitable biomass falls below the limit reference point (B*lim* 20%), there will be no more targeted fishing of the stock until a rebuilding strategy is established to increase the exploitable biomass above the limit within the minimum timeframe that would be taken to rebuild in the absence of any fishing effort.

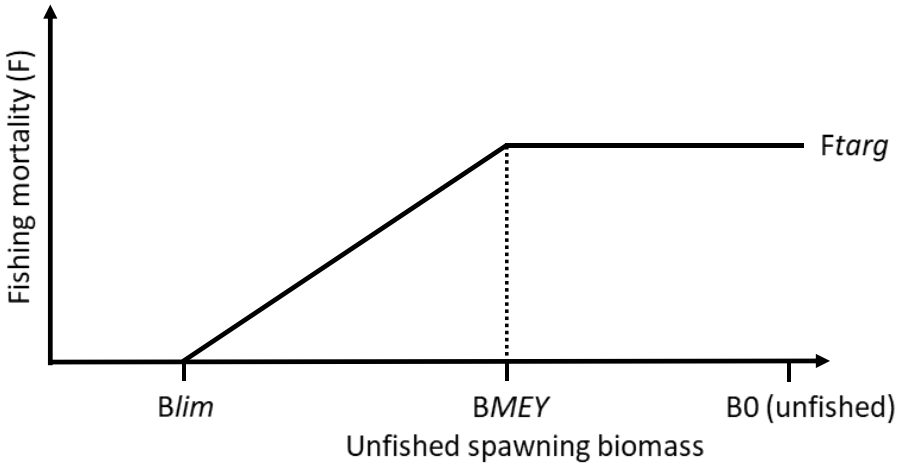


Figure 1: showing the "hockey stick" rule, B*lim* is limit reference point, B*mey* is the biomass at MEY, B0 is the unfished biomass at 100%, F is fishing mortality and F*targ* is the level of fishing mortality for B*mey*.

Management of Tier 2 species

For Tier 2 species where the primary performance indicator (biomass) is not available, catch triggers are used to inform increases in fishing mortality. Annual catch levels are assessed against a reference level to detect changes in catch that may represent an unacceptable risk to individual Tier 2 quota group. The catch triggers are defined in Table 4 and have been informed from a management strategy evaluation. If the annual catch for a Tier 2 species exceeds its trigger level, then a TAC will be set to maintain the annual catches of that species at, or below, the trigger level until a further assessment can be undertaken. Other performance indicators for the stock (e.g. stock status, length frequency distributions, standardised commercial catch rates, total harvest etc.) will also be reviewed by the fisheries working group to ensure that stocks are performing in a way that will achieve the target biomass.

Table 4. Trigger reference levels for Tier 2 species

Species	**Trigger reference level (tonnage)**	**Species**	**Trigger reference level (tonnage)**
Prickly redfish	40t	Amberfish	50t
Blackfish	25t	Flowerfish	25t
Curryfish (*S. vastus*)	25t	Lollyfish	50t
Curryfish (*S. hermanni*)	50t	Snakefish	25t
Sandfish	15t	Pinkfish	50t
Golden sandfish	10t	Elephant trunkfish	50t
Surf redfish	25t	Tigerfish	25t
Deep water redfish	25t	Greenfish	50t
Stonefish	10t	Brown sandfish	25t

Rotational harvest

The fishery also operates under a rotational harvest arrangement (RHA), aimed to mitigate risk of sea cucumber stocks by spreading fishing effort. Under the RHA, the fishery area is split into 158 zones, where each of the 158 zones are allocated a limited number of fishing days (18) only once every three years on a rotational basis (See Appendix A). The objective of the RHA is to reduce the risk of localised depletion and therefore the overall risk of unsustainable fishing practises.

Management of target species

Decision rules for the Tier 1 species

The decision rules below have been designed to provide clear guidance to the TACC setting process for Tier 1 species by defining how advice should be developed and implemented from stock assessments.

1.1 If the biomass is at or above B*targ*, set the TACC at a level that maintains biomass at B*targ*.

1.2 If biomass is below B*targ* and above B*lim*, the TACC should be set as inferred by the hockey stick approach, where fishing mortality is reduced to the rate that allows the biomass to increase effectively back to B*targ*.

1.3 If biomass is below B*lim,* there will be no further targeted fishing for that species, and a rebuilding strategy will be developed to increase the stock biomass to above B*lim* within the minimum timeframe that would be taken to rebuild in the absence of any fishing effort.

1.4 If and when any new information becomes available indicating that the assessment and TACC-setting arrangements are not consistent with the sustainable management of the fishery, the decision rules must be reviewed and, if appropriate, the reference points or timeframes should be adjusted.

Notwithstanding that:

1.5 The rate of fishing mortality should not exceed that required to achieve B*targ* (i.e. F60); and

1.6 The TAC should not exceed the level of fishing mortality required to maintain a stock at MSY.

Breakout rules for burrowing blackfish

1.7 If the annual harvest of burrowing black fish for the defined regions (Appendix 2) is more than the following catch levels; Lizard = 120 tonnes; Gould = 45 tonnes; or Bunker = 60 tonnes, then a competitive TACC will be set at the trigger level and an assessment will be required to determine the risk of localised depletion.

Decision rules for the Tier 2 species

The following harvest control rules are to ensure that fishing does not result in unacceptable levels of fishing pressure on Tier 2 Species. The below rules are set to constrain catch of Tier 2 species within harvest levels based on historical catch limits within the fishery that have been evaluated as acceptable (as outlined in Table 1).

2.1 If the annual harvest of any Tier 2 species is less than the prescribed trigger level (Table 4), then no management action is required.

2.2 If the annual harvest of any Tier 2 species exceeds the prescribed trigger level (Table 4), then a competitive TACC will be set at the trigger level and an assessment will be required to determine the appropriate level of fishing to achieve a 60% biomass target.

Breakout rules

2.3 If a performance indicator (e.g. stock status, length frequency distributions, standardised commercial catch rates, total harvest etc.) suggests that a Tier 2 stock is not performing in a way that will achieve the target biomass level, then further assessment or management may be undertaken.

Management ecological risks from fishing

A foundation of sustainable fisheries management is managing the impact of fishing activities on target and non-target species and the broader marine ecosystem. Ecological Risk Assessments (ERA) identify and measure the ecological risks of fishing activity and identify issues that must be further managed under harvest strategies. The QSCF operates within the Great Barrier Reef World Heritage Area, and as a result this harvest strategy also considers the potential for management action to be taken if fishing for sea cucumber is identified as a high risk under a Great Barrier Reef Marine Park Authority (GBRMPA) Reef Health Incident Response Plan. The below decision rules are in place to minimise and mitigate high ecological risks arising from fishing related activities.

3.1 If an ERA identifies fishing impacts that are considered to generate an undesirable level of risk to any sea cucumber species' populations, (i.e. high risk) a review is triggered to investigate the reason for the increased risk. Appropriate management action should be taken to reduce the risk to acceptable level; and

3.2 To ensure fishery impacts do not result in serious or irreversible harm to the Great Barrier Reef World Heritage Area, where a reef event is identified under GBRMPAs Reef Health Action Plan a review will be led by GBRMPA and additional management action, voluntary or regulated, may be considered in order reduce the risk to an acceptable level.

Fisheries Queensland's Ecological Risk Assessment Guideline is published online at https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable-fisheries-strategy/ecological-risk-assessment-guidelines.

Future risk assessments will be undertaken periodically to reassess any current or new issues that may arise in the fishery. Risk assessments can be undertaken more frequently if there are significant changes identified in fishery operations, management activities or controls that are likely to result in a change to previously assessed risk levels.

Monitoring the social and economic performance

The Sustainable Fisheries Strategy outlines the target to set sustainable catch limits based on achieving maximum economic benefits of the resource, taken initially to correspond to around 60% of exploitable biomass. This is to support the most economically efficient use of the resource, improve the fishing experience for all sectors and promote a resilient system that can bounce back from other adverse environmental conditions (e.g. floods, cyclones and bleaching). The harvest strategy rules have been set up to maintain the stock to this target biomass level.

The following objectives are to support the social and economic performance of this fishery. The management options outlined are intended to provide some guidance on the options that could reasonably be considered if fishery trends are of concern.

Table 5: social and economic indicators for the QSCF

Objective	**Performance indicators**	**Management options**
Maximising profitability of the commercial harvest sector.	Potential indicators to monitor include: • Capacity utilization • CPUE (average per day) • Costs, earnings and net financial and economic profit • Quota sale and lease price • Profit decomposition (using profit or lease price) to determine impacts of prices, costs and stock/catch rates on changes in profits	Consider regulatory and non-regulatory options. Adjust management as needed. Options include minimum quota holding, latent effort review.
monitor the broader social and economic benefits of the fishery to the community	Potential indicators to monitor include: • Fisher satisfaction (with their fishing experience – commercial and recreational) • Percent of quota/licences that are owned (rather than leased) • Gini coefficient of quota owner (measure of concentration) • Percent of total costs/inputs purchased from local businesses/residents • Income generated (crew plus profit – gross value added) • Proportion of catch sold locally • Fish prices • Number of platforms/number of active licenses/total capacity • Community satisfaction (with their fisheries and the way in which they are managed)	Consider regulatory and non-regulatory options. Adjust management as needed

Monitoring and assessment

Fishery-dependent information

The catch and effort data required to determine the standardised commercial catch rate for harvested sea cucumber species is obtained through commercial logbook returns. The QSCF logbook is at https://www.business.qld.gov.au/industries/farms-fishing-forestry/fisheries/monitoring-reporting/requirements/logbooks.

As the QSCF is a quota-managed fishery, real-time reporting and catch disposal records are also required to provide an accurate record of the catch. All boats in the QSCF are require to have vessel tracking installed and operational on all primary and tender vessels to verify fishing effort reported in commercial fishing logbooks.

No modelled stock assessment is currently available for the sea cucumber fishery. It is a priority under this harvest strategy to develop a modelled stock assessment for the commercial fishery area to inform the TAC setting process.

Information and research priorities

Key information and research priorities have been identified in Table 6 to help meet the objectives of this harvest strategy. These will be updated as required.

Table 6: Information and research priorities for the QSCF

Project Description	Explanation of Need	Priority
Biomass-based stock model for Tier 1 species	Modelling to underpin performance management of this fishery in accordance with the decision rules	High
White Teatfish	Assessment of stock	High
Black Teatfish	Assessment of stock	Moderate
Burrowing Blackfish	Assessment of stock	Moderate

Schedule of performance assessment and review

The fishery's performance will be reviewed against this harvest strategy annually. This review will include convening the Sea Cucumber Fishery Working Group in September/October to provide operational advice on the fishery's performance and any matters that may need addressing. The primary performance measure for review will be exploitable biomass, with a review of catch and effort data in intervening years. Table 7 summaries the key review and decision points for the QSCF.

Table 7: Anticipated performance schedule for the QSCF

	Year 1- 2021/22	**Year 2 - 2022/23**	**Year 3- 2023/24**	**Year 4- 2024/25**	**Year 5- 2025/26**	**Year 1- 2021/22**
Monitoring and assessment Activity	Modelled Assessment (Tier 1 Species)	Catch and effort monitoring	Industry Survey (White Teatfish), Catch and effort monitoring	Modelled Assessment (Tier 1 Species)	Catch and effort monitoring	Industry Survey (Burrowing Blackfish), Catch and effort monitoring
Management activity	Review of TAC, declaration made if required	Review of catch and effort data and bring forward TAC decision if needed	Review of catch and effort data and bring forward TAC decision if needed	Review of TAC, declaration made if required	Review harvest strategy and reset reference points and TAC if required	Review of catch and effort data and bring forward TAC decision if needed

The above schedule outlines the expected timeframes that assessment information will be available to inform management action. There may be instances where an assessment may need to be available prior to, or delayed beyond the scheduled date. Any change to the schedule should be considered by the working group and decided on by the chief executive based on the below conditions:

- If during the period between scheduled stock assessments the chief executive is concerned that a performance indicator (e.g. stock status, length frequency distributions, standardised commercial catch rates, total harvest, age distributions etc.) suggests that the stock is not performing in a way that will achieve the target biomass level, the chief executive may decide that a stock assessment will be undertaken before the scheduled timeframe.
- If the chief executive is satisfied that; (1) indicators for the stock suggests that it is achieving, or rebuilding to, target biomass levels, and that there is a low ecological risk to the stock under the current management arrangement (i.e. TAC levels); (2) or if resourcing requirements prohibit the ability for an assessment to be delivered in the scheduled timeframe, the chief executive may decide that a scheduled stock assessment will be delayed.

Schedule of review

This harvest strategy will remain in place for a period of five years, after which time it will need to be fully reviewed in accordance with the *Fisheries Act 1994*.

While harvest strategies provide certainty and transparency in terms of management decisions in response to fishery information, there needs to be flexibility to allow new information or changing circumstances to also be considered. Consequently, the harvest strategy may be subject to further review and amendment as appropriate within the five year period if the following circumstances arise:

- There is new information that substantially changes the status of a fishery, leading to improved estimates of indicators relative to reference points;
- Drivers external to management of the fishery increase the risk to fish stock/s;
- It is clear the harvest strategy is not working effectively and the intent of the Queensland Harvest Strategy Policy is not being met.

Further explanation and information on the processes for amending harvest strategies can be found in the Queensland Harvest Strategy Policy, published at https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable-fisheries-strategy/harvest-strategy.

Appendix A: Rotational harvest arrangement

Annual zone allocation

YEAR 3					YEAR 1					YEAR 2				
C3	C6	C7	C10	C13	C1	C4	C8	C11	M3	C2	C5	C9	C12	M1
M2	M5	M8	M11	M14	M6	M9	M12	M15	M18	M4	M7	M10	M13	M16
M17	M20	M23	M26	M29	M21	M24	M27	M30	M33	M19	M22	M25	M28	M31
M32	M35	M38	M41	M44	M36	M39	M42	M45	M48	M34	M37	M40	M43	M46
M47	M50	M53	M56	M59	M51	M54	M57	M60	M63	M49	M52	M55	M58	M61
M62	O1	O4	O7	O10	O2	O5	O8	O11	O14	O3	O6	O9	O12	O15
O13	O16	O19	O22	O24	O17	O20	O25	O28	O31	O18	O21	O23	O26	O29
O27	O30	O33	O36	O39	O34	O37	O40	O43	O46	O32	O35	O38	O41	O44
O42	O45	O48	O51	O54	O49	O52	O55	O58	O61	O47	O50	O53	O56	O59
O57	O60	O63	O66	O69	O64	O67	O70	O73	O76	O62	O65	O68	O71	O74
O72	O75				O22a	CS1	Ash	Boot		O77	CS2			