



Spanner crab fishery
harvest strategy: 2020–2025

Business unit owner Management and 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	October 2019	Draft harvest strategy for consultation
2.0	April 2020	Approval of final harvest strategy

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What the harvest strategy is trying to achieve

The performance indicators for the spanner crab fishery (commercial catch rates and a fishery independent survey) have declined over recent fishing seasons. As a result of this decline, the spanner crab stock is currently listed as 'depleting'. This harvest strategy has been developed to rebuild the spanner crab stock to levels previously considered sustainable. This harvest strategy will inform decision-making through clear fishery objectives, performance indicators, triggers for management action and appropriate management responses based on the status of Queensland's spanner crab stock.

Primary management methods for Queensland's spanner crab fishery are individual transferable quotas (ITQs) for commercial fishing and in-possession limits for recreational fishing. The decision rules are designed to set catch at levels appropriate for rebuilding to the 60% biomass target, minimising the risk of a full fishery closure and maintaining catch shares amongst sectors.

Fishery overview

The spanner crab fishery is single species fishery, with the majority of catch coming from the commercial sector. The fishery extends across all Queensland waters and consists of two separate management areas (A and B) divided by latitude 23 degrees south (near Yeppoon). Most of the catch from the fishery occurs within managed area A (the southern component of the fishery), where the fishery is managed using ITQs. Managed area B (the northern component of the fishery) has recorded very little activity in recent years.

The fishery targets adult crabs using baited tangle nets (dillies) placed on the sea floor. Crabs are caught when their legs become enmeshed in dillies when feeding on the bait. While the species has a wide depth distribution, with the commercial catch taken principally from depths between 30 m and 80m.

The fishery was established in the 1970s and expanded considerably in the 1990s, with catches peaking at over 3000 tonnes in 1994. The fishery has reduced in size since the introduction of ITQs in 1999 and the setting of a total allowable commercial catch (TACC). After 2012, the fishery experienced several years of declining catches (to below 1000 tonnes), as well as reduced commercial and survey catch rates.

In 2019, there were around 50 commercial vessels operating in the spanner crab fishery and the TACC was set at 847 tonnes (down from 1631 tonnes) in an effort to reduce fishing mortality to below 2018 harvest levels.

Historic data on the recreational catch of spanner crabs in Queensland indicates that total harvest for the sector is likely to be 1–2 tonnes. The charter sector has historically reported small catches (< 10 tonnes) in the fishery, with recent catches being less than 2 tonnes.

There is no data on the level of spanner crab harvest by Aboriginal peoples and Torres Strait Islanders fishing for traditional purposes; however, as this species occurs in offshore waters deeper than 30 m, it's likely to be negligible.



Fish stocks covered by the harvest strategy

On the east coast of Australia, spanner crabs have a relatively continuous distribution from Yeppoon in Queensland to Ballina on the north coast of New South Wales. Spanner crabs along the east coast between Queensland and New South Wales are assumed to constitute a single biological stock. This harvest strategy relates to the catch of spanner crabs in Queensland waters (Table 1).

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

Feature	Details
Target species	Spanner crab (<i>Ranina ranina</i>)
Biology	<p>Spanner crabs are a relatively long-lived and slow-growing crab species. There is a marked sexual dimorphism in spanner crabs, with male spanner crabs reaching 150 mm rostral carapace length (RCL), while females rarely exceed 120 mm RCL. The best estimate of age at maturity is 4–6 years old.</p> <p>Although certain aspects of the species' life cycle, biology and behaviour are well documented, information on critical elements of their population dynamics (e.g. growth rates, age at maturity, longevity and recruitment) remain uncertain.</p> <p>It is documented that the catchability of spanner crabs is influenced by their seasonal reproductive and moult cycle, with spawning occurring from September to November. Newly moulted crabs enter the fishery during the autumn months.</p>

Management units

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

- commercial spanner crab fishery (managed area A) is tidal waters south of latitude 23° south and east of longitude 151°45' east
- commercial spanner crab fishery (managed area B) is Queensland waters north of commercial spanner crab managed area A and east of longitude 142°31'49".

Summary of management information

A summary of the management arrangements for the spanner crab fishery are set out in Table 2 (overleaf). Fishers should consult the relevant fisheries legislation for the latest and detailed fishery rules.

Table 2: Summary of management arrangements for the spanner crab fishery

Feature	Details
Commercial access	C2 and C3 commercial fishing symbols
Relevant fisheries legislation	<ul style="list-style-type: none"> • <i>Fisheries Act 1994</i> • Fisheries (General) Regulation 2019 • Fisheries (Commercial Fisheries) Regulation 2019 • Fisheries Declaration 2019 • Fisheries Quota Declaration 2019
Other relevant legislation	<ul style="list-style-type: none"> • <i>Great Barrier Reef Marine Park Act 1975</i> • Great Barrier Reef Marine Park Regulations 2019 • <i>Environment Protection and Biodiversity Conservation Act 1999</i> • <i>Marine Parks Act 2004</i>
Working group	Spanner crab fishery working group (terms of reference and communiques are available online)
Gear	<p>The following apparatus is permitted for use:</p> <ul style="list-style-type: none"> • dilly nets no larger than 1 m² with a single layer of mesh only and a minimum mesh size of 25 mm
Main management methods	<ul style="list-style-type: none"> • Spawning closure from 1 November to 15 December • Minimum legal size of carapace 10 cm • No take of egg-bearing females <p>Commercial only:</p> <ul style="list-style-type: none"> • primary management method is ITQ (managed area A) • basket limits (managed area B) • limit on maximum number of dillies: 45 for 1 person on board, 75 for 2 people on board <p>Recreational (and charter) only:</p> <ul style="list-style-type: none"> • in-possession limit • maximum of 4 dillies per person • maximum of 10 dillies per string for charter fishers
Fishing year	1 July to 30 June
Stock status	<p>Status of Australian fish stocks reports (visit fish.gov.au): spanner crab listed as 'depleting'* (2018)</p> <p>*The classification system used as part of this reporting is assessed against 20% biomass sustainability criteria. Therefore, although a species may be classified as 'sustainable', it does not mean that the biomass meets the targets set out in the <i>Queensland Sustainable Fisheries Strategy: 2017–2027</i>.</p>
Accreditation under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>Part 13: Accredited (expires 2025)</p> <p>Part 13A: Accredited (expires 2025)</p> <p>Visit environment.gov.au</p>

Fishery objectives

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

- rebuild the Queensland spanner crab resource to 60% of the exploitable biomass (as a proxy for maximum economic yield), while
 - minimising and mitigating high ecological risks arising from fishing-related activities
 - maximising profitability for the commercial sector
 - monitoring the social and economic benefits of the fishery to the community
 - maintaining sectoral allocations for spanner crab resources among commercial, recreational and charter fishing sectors.

Catch shares

This harvest strategy aims to maintain the existing catch shares between sectors. The resource allocation arrangements are set out in Table 3 to ensure that catch shares among sectors are maintained in response to changes in the total allowable catch.

The traditional fishing rights of Aboriginal peoples and Torres Strait Islanders 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 *Aboriginal and Torres Strait Islander commercial fishing development policy*, access through an Indigenous fishing permit (issued in accordance with section 54 of the Fisheries (General) Regulation 2019) is available on a case-by-case basis to provide opportunities for communities to take part in fishing-related business. Where sustainability is at risk, access to fisheries resources may not be available.

Table 3: Resource allocation arrangements for the spanner crab fishery

	Commercial fishing*	Recreational fishing** (including charter)
Proportion of total harvest	99%	1%

* Commercial catch information collected through commercial logbook requirements.

** Recreational catch share includes charter fishing and is based on information from the statewide recreational fishing surveys.

Managing performance of the fishery

The decision rules for setting the TACC outlined in this harvest strategy were tested using management strategy evaluation, which involves simulating the relative effectiveness of different harvest control rules for achieving management objectives. Several control rules were tested, including the most recent decision rules used in the fishery, and multiple sets of rules developed in an industry, science and management workshop.

The set of decision rules deemed most appropriate for informing the future management of the spanner crab fishery were developed in collaboration with stakeholders at the workshop. These decision rules best met the objectives of rebuilding the unfished biomass to 60%, minimising the risk of fishery closure and conflict between indicators, and maximising annual harvest. The harvest strategy focuses on rebuilding the stock from its 'depleting' stock status.

Two performance indicators have been selected to describe fishery performance in relation to the objectives, with associated reference points identified to establish acceptable performance:

- annual standardised catch rate (catch per unit effort) of spanner crabs by commercial fishers (sCPUE)
- catch rate of legal-size crabs from the standardised fishery independent survey (sFIS) in Queensland waters.

These are determined to be the most informative indicators of stock abundance.

A range of target reference points were tested as part of the management strategy evaluation process for this harvest strategy. The reference points are based on catch rates during a reference period of 2006–2010. This reference period represents a time of operational efficiency for the commercial fishery (strong catch rates) and stable sFIS catch rates. By aligning the target reference points to this reference period, the operation of the decision rules aims to rebuild stocks to the biomass during this reference period as a proxy for 60% biomass. Importantly, the same reference period has been chosen for each indicator for consistency and to allow the pooled index (average of the sFIS and sCPUE) to be more responsive.

The target reference point for spanner crabs has been calculated based on the average of sCPUE and sFIS catch rates during the reference period (Table 4). If the stock is at target level, it is deemed to be sustainable and achieving the fishery objectives.

The lower limit reference point is set at a commercial index value of 0.5 kg per dilly lift, which represents a proxy for approximately 20% biomass in the fishery. To provide greater certainty in decision-making under a declining resource, the lower limit is set based on the sCPUE index only, rather than the pooled index. To achieve a sustainable stock and economically efficient commercial sector, the upper TACC limit for the fishery is set at 1300 tonnes and the lower TACC limit is set at 300 tonnes. During management strategy evaluation, these limit reference points were demonstrated to reduce the likelihood of a fishery closure. The amount that the TACC can change from one TACC period to the next is limited through a maximum and minimum change buffer to help reduce TACC variability over the short term. In addition to the buffers, the TACC is set every two years to reduce further inter-annual TACC variability. All performance indicators and reference points are outlined in Table 4.

Table 4: Performance indicators and reference points for the spanner crab fishery

Performance indicator	Reference point/buffer	Reference level
Standardised commercial catch rate of spanner crabs in kilogram per dilly lift (sCPUE)	Target reference point proxy for 60% biomass	95% of the 2006–2010 average standardised catch rate
Catch rate of spanner crabs from the standardised fishery independent survey in legal crabs per ground line (sFIS)	Target reference point proxy for 60% biomass	95% of the 2006–2010 average standardised catch rate
sCPUE of spanner crabs averaged over two consecutive years	Limit reference point proxy for 20% biomass	0.5 kg per dilly lift
Pooled index – average of the sCPUE and sFIS	Target reference point	1
TACC	TACC upper limit	1300 tonnes
TACC	TACC lower limit	300 tonnes
TACC change	Minimum change buffer	50 tonnes
TACC change	Maximum change buffer	200 tonnes

Management of target species

Decision rules for managed area A

The decision rules below have been designed to provide clear guidance for the TACC-setting process by defining how changes in the pooled index should be interpreted and by linking them to a set of decision rules for adjusting the TACC. The decision rules specified below use the performance indicators in Table 4 and follow the decision tree diagram in Appendix A: Decision rules to set the spanner crab TACC.

Increase in the TACC

The TACC is increased when the following conditions are met in a TACC-setting year:

- 1.1 The pooled index is greater than 1 and the current index is above the previous year's index.

If the above conditions are met, the TACC increase will be equal to:

- 1.2 the proportion of change between the current index and the previous year index, **with**
- 1.3 a limit of no more than 200 tonnes to be issued in any given year, **and notwithstanding that**
- 1.4 the new TACC must not exceed 1300 tonnes.

Decrease in the TACC

The TACC is decreased when the following conditions are met in a TACC-setting year:

- 2.1 The pooled index is less than 1 and the current index is below the previous year's index.

If the above conditions are met, the TACC decrease will be equal to:

- 2.2 the proportion of change between the current index and the previous year index, **with**
- 2.3 a limit of no more than 200 tonnes to be issued in any given year, **and notwithstanding that**
- 2.4 the new TACC must not be less than 300 tonnes.

Closure of managed area A (this rule takes precedence)

The TACC for managed area A will be equal to zero if:

- 3.1 the average sCPUE is less than 0.5 kg per dilly lift.

No change in the TACC

The TACC is to remain unchanged if:

- 4.1 none of the above conditions are met in a TACC-setting year, **or**
- 4.2 the new TACC is within 50 tonnes of the current TACC.

Review of TACC or decision rules

- 5.1 If the pooled index has either increased or decreased consecutively over each of the three most recent years and no change to the TACC has occurred, the TACC for the forthcoming year must be adjusted by 50 tonnes to reflect the recent trend, **or**
 - 5.2 If the commercial index in any monitoring region is 40% or more below the previous year's index, it must be determined why the decline occurred and whether further management intervention is required to reduce the risk of localised depletion, **or**
 - 5.3 If 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 must be adjusted.
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Decision rules for managed area B

The spanner crab fishery harvest strategy will also monitor and manage changes in fishing pressure within managed area B. The decision rules for managed area B below are designed to manage the commercial catch at levels considered to be low risk to the fishery (20 tonnes).

- 6.1 Should catch in managed area B exceed 20 tonnes within any fishing season, a review must be undertaken to determine the likely circumstances that caused the trigger breach and if the breach is likely to continue to occur in future (i.e. the circumstance giving rise to the breach is not temporary in the fishery), **and**
 - 6.2 If the breach is deemed temporary, no further management action required other than continued monitoring (for further breaches), **or**
 - 6.3 If the breach is deemed likely to occur again, management action must be undertaken (i.e. establishment of a TACC) to ensure that catch is maintained within sustainable levels.
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Recreational and charter sector management

To ensure that no one fishing sector is increasing their catch share at the expense of another sector, the harvest strategy has been designed to include decision rules for maintaining catch shares between sectors. As the commercial catch of spanner crab is limited through a TACC, the recreational in-possession limit will serve to constrain the recreational (and charter) fishing harvest. The below decision rules relate to changes in recreational harvest from the statewide recreational fishing survey and charter fishing logbooks.

- 7.1 If a recreational harvest estimate is no more than 5% above the allocated recreational catch proportion, no management action is required.
 - 7.2 If an estimate of recreational harvest exceeds the catch share by greater than 5%, the recreational in-possession limit will be decreased by a quantity of 5 crabs
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Management of ecological risks from fishing

The foundation of sustainable fisheries management is managing the impact of fishing activities on non-target species and the broader marine ecosystem. Ecological risk assessments identify and measure the ecological risks of fishing activity and identify issues that must be further managed under harvest strategies. The below decision rules are in place to minimise and mitigate high ecological risks arising from fishing-related activities.

- 8.1 If an ecological risk assessment identifies fishing impacts that are considered to generate an undesirable level of risk to any secondary or bycatch 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 an acceptable level.
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The most recent ecological risk assessment for the spanner crab fishery was completed in 2012. It found that impacts on the environment by the spanner crab fishery were negligible to minor. The next assessment is scheduled for 2019. The *Ecological risk assessment guideline* is available at fisheries.qld.gov.au.

Monitoring social and economic performance

The *Queensland Sustainable Fisheries Strategy: 2017–2027* outlines the target to set sustainable catch limits based on achieving maximum economic yield, which is usually around 60% of unfished 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). The harvest control rules have been set up to rebuild the stock to this target biomass level.

The objectives and performance indicators in Table 5 will be used to monitor 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 spanner crab fishery

Objective	Performance indicators	Management options
Maximise profitability of the commercial sector	<p>Indicators to monitor include:</p> <ul style="list-style-type: none"> • fishing capacity (i.e. number of platforms) • catch per unit effort (average day) • costs, earnings and net financial and economic profit • quota sale and lease price <p>The pooled index stabilises around the target reference point (maximum economic yield proxy) and the TACC increases to the upper limit</p>	<p>Consider non-regulatory and regulatory options to address relevant issues</p> <p>Adjust management as needed</p> <p>Investigate and implement management measures that minimise cost and promote efficiency (e.g. new decision rules on opening/closing times or change to dilly limits)</p>
Monitor the social and economic benefits of the fishery to the community	<p>Indicators to monitor include:</p> <ul style="list-style-type: none"> • fisher satisfaction • percentage of quota/licences that are owned/leased • income generated (crew plus profit—gross value added) • proportion of catch sold locally • crab prices 	<p>Consider regulatory and non-regulatory options</p> <p>Adjust management as needed</p>

Monitoring and assessment

The catch and effort data required to determine the standardised commercial catch rate for harvested spanner crab is obtained through commercial logbook returns. For the spanner crab fishery logbook, visit business.qld.gov.au.

As the spanner crab fishery 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 fishery are required to have a vessel tracking unit 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 spanner crab fishery. Commercial catch rates are standardised to account for a range of potential influencing variables. The current catch rate standardisation considers fishing years, regions and months, as well as the main effects of fishing effort of individual vessels (the number of net lifts, which was a function of the number of ground lines used, nets per ground line and lifts per ground line), the spatial resolution of catches based on 30 × 30 min latitude and longitude grids, fishing power and the lunar cycle. The standardised commercial catch rates are based on the performance over a calendar year season (i.e. 16 December to 31 October).

Since 2000, an annual fishery independent survey (FIS) of spanner crab has been conducted in Queensland waters during May. Catch rate measures of abundance are collected from 25 areas (6 × 6 min grids) across the Queensland fishery. In all, 15 individual ground lines (the sampling units), each consisting of 10 nets, are set in each area. The net soak times with the number of spanner crabs caught and their gender and size (rostral carapace length) are recorded.

FIS catch rates are based on the catch of legal size crabs in Queensland to ensure metrics are consistent with the fishery-dependent information. The FIS catch rates are standardised to accommodate for zero catch data experienced in the survey, and represents the overall standardised average number of spanner crabs per ground line equivalent to the median net hours of fishing.

Monitoring of east coast spanner crabs is currently undertaken through a collaborative arrangement between Queensland and New South Wales fisheries agencies. While this harvest strategy is designed to manage and set quota for the Queensland area of the fishery, the FIS and commercial catch rate information from the entire biological stock range is reviewed as part of the quota-setting process in Queensland.

If a single year of FIS or commercial catch rate data is unavailable due to drivers external to the fishery, the harvest strategy will be used to make a decision consistent with the intent of the rules using the information available.

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 spanner crab fishery

Project description	Explanation of need	Priority
Data review: size structure monitoring from commercial catches, FIS design, standardisation of catch, actual quota data vs logbook data, regionalisation, FIS/commercial	Inform future monitoring and ensure the maximum value is gained from current programs	High
Exploring collection of additional logbook data, such as discards and undersize catch	Valuable for establishing overall mortality and recruitment indices	High
Determine the effect of depredation on catch rates and fishing mortality	Understand depredation to inform TACC setting and management	High
Investigate spatial dynamics and connectivity of spanner crabs in the fishery	Source and sink population, due to concern over localised depletion	High
Explore abundance in green zones	Understand whether environment or fishing effort affected stocks	High
Industry code of practice around handling/taking of crabs	Increase stewardship, improve product quality and reduce discard mortality	Medium
Undertake a spawning times/areas investigation to see if they have shifted with environmental change	Investigation of spanner crab spawning times last completed in 1980's—updates could inform closure times	Medium
Explore novel solutions for data collection (e.g. apps or electronic monitoring)	Develop a large fishery-dependent dataset on size, abundance and damage of crabs	Medium

Schedule of performance assessment and review

The fishery's performance will be reviewed against this harvest strategy annually. This review will include convening the spanner crab working group in February/March to provide operational advice on the fishery's performance and any matters that may need to be addressed. Performance will be measured by reviewing standardised catch rates and the FIS results biennially, with a review of catch and effort data in intervening years.

Table 7: Anticipated performance schedule for the spanner crab fishery

	Year 1 (2020–21)	Year 2 (2021–22)	Year 3 (2022–23)	Year 4 (2023–24)	Year 5 (2024–25)
Monitoring and assessment activity	Standardised catch rates and FIS results	Monitor commercial and FIS catch rates	Standardised catch rates and FIS results	Monitor commercial and FIS catch rates	Standardised catch rates and FIS results
Management action	Review TACC (declaration made if required)	Review catch and effort data	Review TACC (declaration made if required)	Review catch and effort data	Review harvest strategy, assessment and TACC decision

This harvest strategy will remain in place for a period of five years, after which time it will need to be 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
 - a new recreational harvest estimate becomes available that suggests the defined sectorial catch shares may have been set incorrectly or may be unrepresentative
- or
- it is clear the harvest strategy is not working effectively and the intent of the Queensland *harvest strategy policy is not being met*.

For more information on the processes for amending harvest strategies, refer to the Queensland harvest strategy policy available at publications.qld.gov.au.

Appendix A: Decision rules to set the spanner crab TACC

