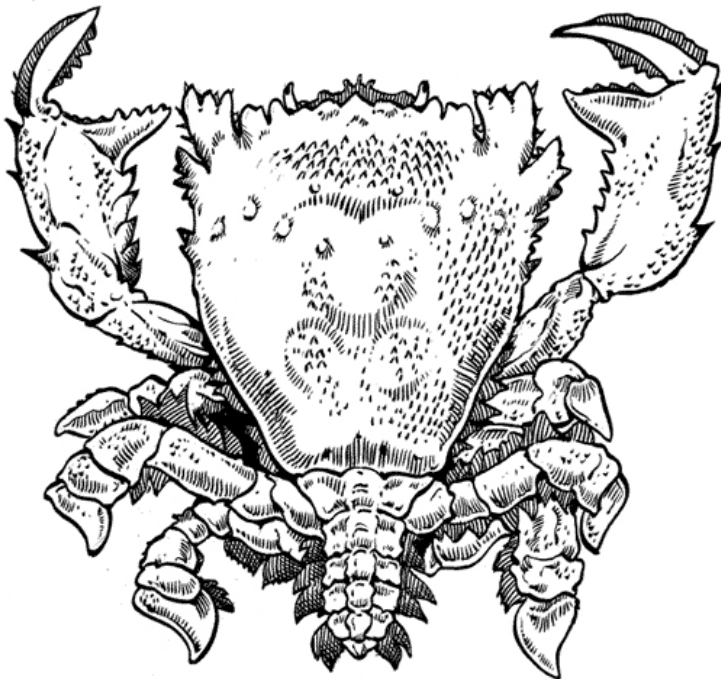


Fisheries Long Term Monitoring Program Sampling Protocol

Spanner Crab: (2000 onwards)

Section 1

November 2005



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General Disclaimer:

The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

This publication provides information on the LTMP spanner crab sampling methods.

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Section 2 - Operational Protocols

Section 2 of this sampling protocol can be obtained by contacting the Fisheries Data Coordinator:

Telephone +61 7 3405 6822, Fax +61 7 3224 2805 or Email

FishDataCoordinator@dpi.qld.gov.au

Acronyms

C2	Fishery symbol of the Queensland spanner crab fishery
CFISH	Commercial Fisheries Information System, DPI&F
CPUE	Catch per unit effort
CrabMAC	Crab Fishery Management Advisory Committee
DPI&F	Department of Primary Industries and Fisheries, Queensland
LTMP	Long Term Monitoring Program, DPI&F
ITQ	Individual transferable quota
RAP	Representative Area Program, Great Barrier Reef Marine Park Authority
SOCI	Species of conservation interest
TACC	Total allowable commercial catch

Rationale

The spanner crab fishery is managed by the Department of Primary Industries and Fisheries (DPI&F) by output controls, involving an annually reviewed Total Allowable Commercial Catch (TACC) (Brown *et al.* 2001) divided up between some 240 licensed operators by way of Individual Transferable Quota (ITQ) units. One hundred thousand ITQ units were allocated in mid-1999, on the basis of prior history in the fishery. The *Fisheries (Spanner Crab) Management Plan 1999* sets out the objectives of management, performance indicators and review events.

The present TACC-setting decision rules are based on performance criteria derived from commercial catch rates which, until further information becomes available, are deemed to be indicative of stock abundance. However, there is concern about the reliability of fishery-dependent catch rates as indicators of stock abundance. This is partly because the stock is not uniformly distributed, resulting in fishers targeting aggregations of crabs. Such a fishing strategy is not uncommon, but it means that declining overall abundance may not be revealed as a signal in the commercial catch rates until the stock is very seriously depleted. It is also partly due to the use of a 'passive' fishing method, the success of which may vary considerably in response to changes in the behaviour of the target species.

At the Fisheries Research and Development Corporation sponsored Stock Assessment Review Workshop (Southern Fisheries Centre; August 1998 - Dichmont *et al.* 1999) it was agreed that, largely because of concerns outlined above, one of the most pressing issues for this fishery in Queensland was the establishment of a fishery-independent monitoring program. The Crab Fishery Management Advisory Committee (CrabMAC) to DPI&F has strongly endorsed the need for corroborative data on stock abundance, and has incorporated a significant element of industry contribution for such a programme in the *Fisheries (Spanner Crab) Management Plan 1999*.

A blocked stratified random design was developed for sampling the Spanner crab resource. The design allows representative sampling of aggregating species which populate a wide spatial area. It also allows comparisons to be made with existing commercial logbook data, whilst remaining cost effective.

Objectives

The DPI&F Long Term Monitoring Program's (LTMP) principal objective is to provide the Spanner Crab Stock Assessment Group to CrabMAC with independent information about the abundance of spanner crabs in selected regions of the commercial fishery. This is achieved by providing information on:

- spanner crabs
 - size and sex composition of the spanner crab catch
 - catch per unit effort (CPUE)
- instances of species of conservation interest (SOCI) interaction with the survey operation
- in accordance with the Australian Government Department of the Environment and Heritage recommendations associated with the fishery accreditation (<http://www.deh.gov.au/coasts/fisheries/qld/spanner/decision.html#recommendations>) bycatch is monitored. Bycatch composition is monitored in two out of every five years by recording:
 - species
 - size
 - total weight of species

Sites

The five assessment regions (two to six) comprising Managed Area A (Figure 1) of the Queensland spanner crab fishery are defined as follows:

Region 2	23° 00' to 24° 00' S (Yeppoon-Bustard Head (Area A waters only))
Region 3	24° 00' to 25° 00' S (Bustard Head-Indian Head)
Region 4	25° 00' to 26° 30' S (Indian Head-Noosa)
Region 5	26° 30' to 27° 30' S (Noosa-Point Lookout)
Region 6	27° 30' to 28° 12' S (Point Lookout-Tweed Heads)

Note: Region 1 is in Managed Area B which is not subject to the annual TACC and not monitored as part of the LTMP.

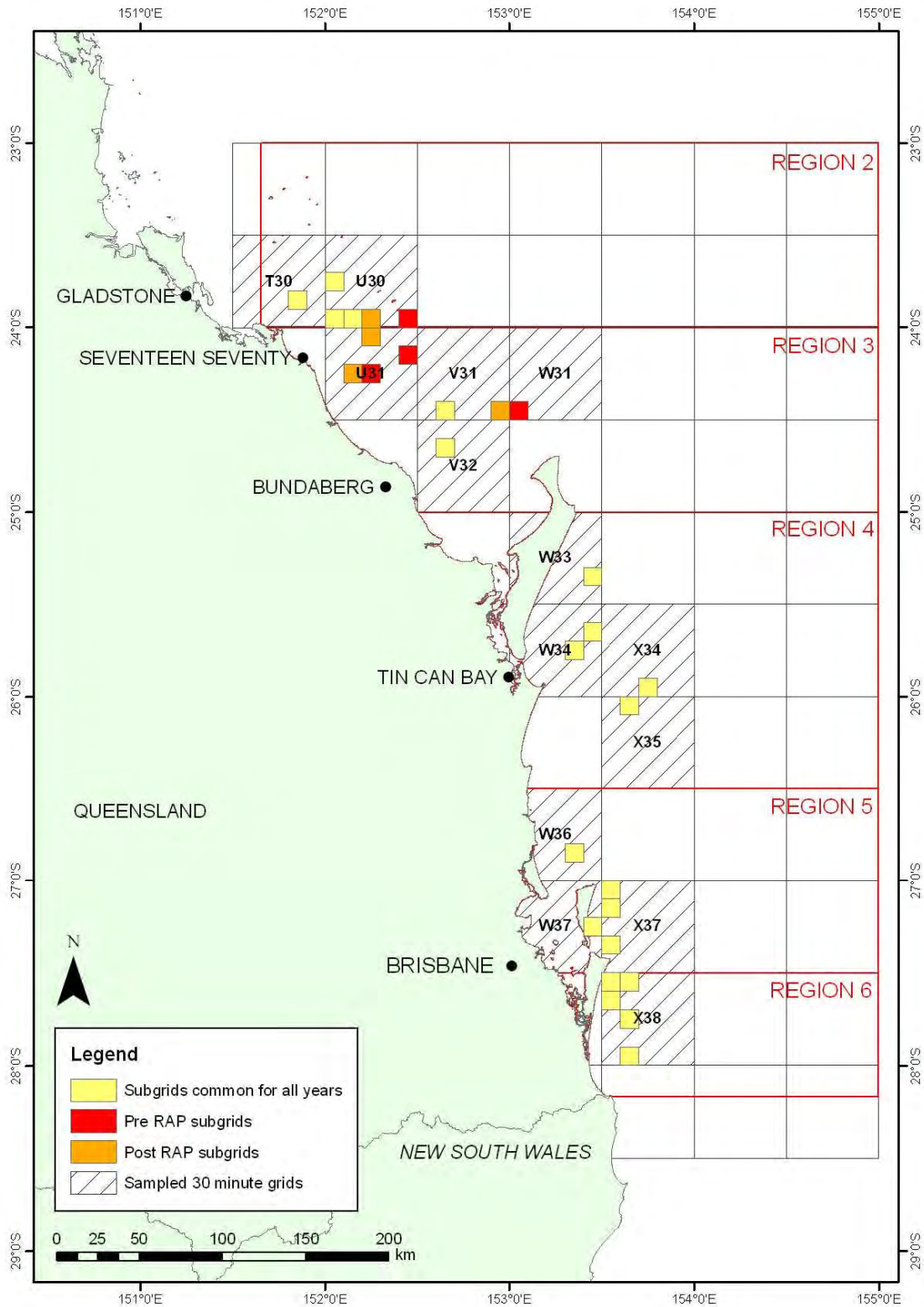


Figure 1. Map showing the CFISH grids sampled in the Long Term Monitoring Program spanner crab survey, before and after the introduction of the Great Barrier Reef Marine Park Authority Representative Area Program (RAP).

Site selection was a two step process, involving: (a) determining the sampling areas within assessment regions, followed by (b) random selection of sites within areas.

(a) Subgrid selection: Areas within assessment regions were selected by extracting the most up-to-date data set from the commercial logbook (CFISH) database, using data only from 1994 when the fleet first began to report fishing position as 6 minute subgrids rather than 30 minute grids.

An initial ranking of the CPUE data was performed separately for each assessment region, and all records in the upper 60th percentile (of CPUE) were selected. These records were then re-ranked according to fishing days (a measure of effort), and from this subset all subgrids where the total fishing days ≥ 100 were selected. A relatively large effort cutoff was required. Initial data exploration revealed errors in the location data which may have led to incorrect choice of subgrids if a smaller effort cutoff (e.g. 20-40 fishing days) been used.

This process led to a list of subgrids in each of the five assessment regions characterised by relatively high catch rates (presumed population density) and fishing intensity (fishing days/year). From these lists, between seven and ten subgrids were selected randomly. Finally, five subgrids (Figure 1) were selected from each of these short-lists with reference to bathymetric charts. Any subgrid that substantially included a feature (e.g. reefs, islands) likely to interfere physically with the fishing operation was avoided.

Each year the subgrids remain fixed, while the sites are re-randomised. The introduction of the Great Barrier Reef Marine Park Authority Representative Areas Program in 2004 closed some subgrids to fishing and extractive research. Alternative subgrids, one in Region 2 and three in Region 3, were chosen based upon them being nearest geographically, to the subgrids that are now in protected areas (Figure 1).

(b) Site selection: Each 6 minute subgrid was divided into a 10 x 10 matrix, giving one hundred possible sampling sites. Thirty unique random integers were selected within the range 1-100 for each subgrid and each region. From these lists the final selection of fifteen sites per subgrid per region was made with reference to bathymetric charts, so as to avoid sites that were clearly un-fishable (i.e. water depth greater than 90 m or on land). The fifteen sites within each subgrid were re-randomised each year while the subgrids remain fixed.

If circumstances indicated that sampling a particular site was dangerous, might interfere with a commercial fishing operation close-by, or could result in damage to the gear, it was replaced with an alternative site. An explanation for substitution was recorded.

This process resulted in the selection of 5 regions x 5 subgrids per region, with 15 sites per subgrid, a total of 375 sites. These were recorded as latitude/longitude co-ordinates and stored in a Microsoft Excel[®] spreadsheet.

Times

Spanner crab catch is not affected by lunar cycle, therefore this is not a constraint to survey timing. Sampling is conducted in May each year, because this timing is:

- not within the fishery spawning closure (20 November - 20 December)
- outside the known spawning period of crabs in Queensland (October to January; Brown 1986, Brown *et al.* 1999) when significant behavioural changes associated with reproduction can greatly influence catch rates.

Each year sampling in each region is conducted simultaneously from multiple vessels, or on dates as close as possible to each other.

Monitoring Procedures

Vessel Charter

Expressions of interest in tendering for the survey work are sought annually from commercial fishers. Early in each survey year, a notice is sent to a large number of C2 licence-holders advising of the survey work and inviting expressions of interest in vessel charter. Potential charter tenderers are asked to bid for one (or more) of the assessment regions. Tenders were evaluated against the predetermined criteria, outlined in the tender document, and awarded on a competitive basis. If no licence-holders register an interest in sampling a region, a DPI&F research vessel is used to sample the region in that year.

Gear and Deployment

The survey employs a fleet of standard traps (dillies), marked lines, floats/dans and weights. When not being used in the survey, this equipment is stored and maintained at the Southern Fisheries Centre (Deception Bay). The dillies are identical, and as close as possible in construction to the "typical" industry configuration as at the 1st January 1999.

The sampling unit is one standard 625 metre string, with 10 dillies and a weight spaced at 50 m intervals for the first 500 m (trotline), with a 125 m headrope. The dillies (traps) are 1 m² (maximum legal size) galvanised steel frames covered with a single layer of 32 mm white 12-ply multifilament nylon mesh (minimum legal size is 25 mm). The mesh is hung with no drop or 'belly' (maximum legal drop is 100 mm). A 600 mm long lanyard is attached to one corner of the frame. A line clip is spliced to the free end of the lanyard and is used to connect the dilly to the trot-line.

A 10 kg weight is attached to the trot-line between the last dilly and the headrope to prevent the traps from moving as a result of the float being affected by current or wind. Attached to the centre of each dilly is a bait bag containing three or four pilchards, depending on their size.

The string of dillies is set at each site, across-current if possible. Weather and sea conditions are recorded at the beginning and end of each day. Location (latitude and longitude), set and lift time, number of dillies set and retrieved, number of baits depleted and water depth are recorded for each set. A data-logger records bottom water temperature. Soak-time is a minimum of 40 minutes, but may be up to one hour. Damage or loss of gear is recorded. This procedure continues until all 15 sites in each of the 5 subgrids in the region have been sampled, usually taking 5 days per region.

Field procedures

Spanner crabs

Crabs are carefully untangled from the dillies, avoiding limb breakage and placed in a plastic box. The species identification is checked before recording the carapace length and gender of each spanner crab. All spanner crabs are released alive as soon as possible.

Bycatch

After 2001, surveys in two out of every five years also sample bycatch. Typically bycatch of spanner crab dillies is exceedingly small (Brown *et al.* 2001) but the species caught can be diverse and sometimes difficult to identify in the field. During years where bycatch is sampled, all individuals captured by the sampling gear other than Spanner Crabs are preserved in 70% methylated spirits and retained for later identification in the laboratory. Three spot crabs and sand crabs are counted, recorded on the bycatch datasheet and returned to the water alive.

Species of conservation interest

Any sightings of turtles or other marine megafauna in the vicinity of the fishing operation are recorded. The instances of SOCI interaction with the Spanner crab fishing gear in the commercial fishery are believed to be extremely rare (Brown *et al.* 2001). In the event that there is an interaction between a SOCI and the fishing gear, detailed records will be made and permit conditions followed. The animal if caught will be released alive as soon as possible.

Laboratory Procedures

Bycatch is processed in the laboratory, and for each subgrid the following is recorded:

- species
- number of each species caught
- size of first 20 specimens of each species (measurements taken as per DPI&F (In Prep.))
- total weight of each species caught.

Permits and Approvals

Permits and Permissions

This project requires current permits or approval from:

- DPI&F - General Fisheries Permit (*Fisheries Act 1994*)
- Great Barrier Reef Marine Park Authority – Marine Parks Permit
- Environmental Protection Agency, Queensland Parks and Wildlife Service - Marine Parks Permit

Survey staff familiarise themselves with and follow all permit conditions and have a copy with them during the survey.

Notifications

The following notifications are sent at least one week prior to the surveys, quoting relevant permit numbers and any variations to the methods:

- Queensland Boating and Fisheries Patrol, DPI&F (Gladstone, Bundaberg, Uranagan, Pinkenba, Southport, Mooloolaba)
- Great Barrier Reef Marine Park Authority (Townsville)
- Queensland Parks and Wildlife Service - Marine Parks (Bundaberg and Rockhampton)

Any interactions with protected species are reported in a timely manner to the appropriate agencies (The Department of the Environment and Heritage, Canberra and/or Environmental Protection Agency, Brisbane)

Other stakeholders and the general public are notified of the survey by DPI&F through a press release. All media releases are authorised by the Regional Co-ordinator, Principal Fisheries Scientist (Assessment and Monitoring) and Regional Manager and final drafts sent to the Fisheries Data Coordinator who forwards the media release to the DPI&F Fisheries Principal Communications Officer. Draft media releases are required by the Fisheries Data Coordinator at least three weeks before the surveys commence. All dealings with the media are undertaken following DPI&F standard procedures.

Data Access

Access to LTMP survey data is subject to a formal application process. The Fisheries Data Coordinator is to be contacted for all applications: Telephone +61 7 3405 6822, Fax +61 7 3224 2805 or Email FishDataCoordinator@dpi.qld.gov.au.

All use of DPI&F data is subject to a data agreement between the Department and the party requesting the data. The data agreement covers how data must be acknowledged in publications and other restrictions that may be placed on data use. If the publication is based substantially on LTMP data and on LTMP survey design then co-authorship may be requested or advised. All documents that utilise LTMP data must be sent to the Fisheries Data Coordinator as drafts for perusal before they are published. Copies of final documents utilising LTMP data must be provided to the Fisheries Data Coordinator free of charge for lodgement in the DPI&F library.

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