Fisheries
Long Term
Monitoring Program
Sampling Protocol

Eastern King Prawn:
(2007 - onwards)

Section 1
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Department of Primary Industries and Fisheries
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Section 1

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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

CFISH  Commercial Fisheries Information System, DPI&F
CL    carapace length
DEH  Department of the Environment and Heritage [now the Department of the Environment and Water Resources], Australia
DPI&F Department of Primary Industries and Fisheries, Queensland
EPA  Environmental Protection Agency, Queensland
LTMP Long Term Monitoring Program, DPI&F
SOCI species of conservation interest
Rationale

The eastern king prawn, *Penaeus plebejus*, is endemic to the east coast of Australia, with its range extending from central Queensland (20°S) to north-eastern Tasmania (42°S) (Ruello 1975). They are trawled in water depths up to 280 m and in the Swain Reefs region they occur over 250 km from the coastline. Eastern king prawns are the largest of the Australian penaeid prawns.

Tag-release experiments conducted in the 1970–80s (Potter 1975; Glaister et al. 1987) indicate eastern king prawns undertake long migrations. Juveniles stay in shallow, coastal nursery grounds for only a few weeks before moving seaward and migrating north as they mature into sub-adults. The sub-adults mature into adults in oceanic waters. The migration is so significant that Lucas (1974) suggested that through the combination of emigration and mortality the Moreton Bay population of eastern king prawns was reduced by 50% every two weeks. Courtney et al. (2002) reported no eastern king prawns greater than 30 mm carapace length (CL) were caught in Moreton Bay during their surveys.

The eastern king prawn fishery is a major component of the Queensland East Coast Otter Trawl Fishery and New South Wales Ocean Trawl Fishery. Approximately two-thirds of the reported landings come from Queensland waters and account for about 30% of the State’s wild harvested prawns. In the Queensland fishery the size of the trawl mesh ranges between 38 and 50 mm with the smallest size used inside Moreton Bay and the largest in the “offshore” fishery which also uses larger vessels, bigger nets and longer trawl shots. Eastern king prawns recruit to near shore trawl grounds at around 14–15 mm CL, at this size commercial nets retain very few individuals (<10%). Inside Moreton Bay full recruitment to the fishery is more likely to be in the 21–23 mm range due to the mesh sizes used. However in the offshore fishery recruits are reported to be 26 mm CL, using 50 mm mesh (Die et al. 1999).

The Department of Primary Industries and Fisheries (DPI&F) currently utilises three legislative instruments in the management of the Queensland eastern king prawn fishery:

- *Fisheries Act 1994*
- *Fisheries Regulation 1995*
- *Fisheries (East Coast Trawl) Management Plan 1999.*

A recent assessment of the management arrangements in the fishery by Department of the Environment and Heritage (DEH) led to recommendations being provided to DPI&F for the East Coast Otter Trawl Fishery (DEH 2004). Current recommendations applicable specifically to the eastern king prawn fishery involve:

- developing and monitoring limit and target reference points for species
- complementary management of shared stocks and
- development of regular and robust assessment processes for target species.
Courtney *et al.* (2002) propose that the assessment of the status of the eastern king prawn stock and the ability to monitor recruitment and predict catches, would be greatly improved if a reliable fishery independent index of recruitment could be measured annually. O’Neill *et al.* (2005) suggest that a reliable fishery independent recruitment index is essential to the accuracy of stock assessment models for eastern king prawns.

Prior to this program, the DPI&F Commercial Fisheries Information System (CFISH) logbooks have been the only time series of catch and effort data available for the fishery. The use of these data for stock assessment purposes has inherent problems including pooling juveniles of species from inshore areas as ‘bay prawns’ and the inability of fishery catch data to accurately define a stock/recruitment relationship. To help address these issues DPI&F, Long Term Monitoring Program (LTMP) undertook the development of this fishery independent eastern king prawn recruitment monitoring strategy. The design of the LTMP survey used data collected by Courtney *et al.* (2002) during a Fisheries Research and Development Corporation project and the 2006 LTMP Eastern King Prawn pilot survey (DPI&F In Prep.a). The LTMP eastern king prawn annual survey is divided into 2 components:

- Preliminary survey — sampling the inshore areas of Deception Bay targeting a smaller size range of eastern king prawns. These data are collected to help explain the level and timing of recruitment that occurs annually in Moreton Bay and to identify if there is a relationship between the number of juveniles in Moreton Bay and the number of pre-recruits in areas outside of the bay.
- The main survey — sampling within Moreton Bay as well as near shore areas on the eastern side of Moreton Island, North and South Stradbroke islands and in Wide Bay.

**Objectives**

The primary objective of the ongoing, annual fishery independent eastern king prawn monitoring component of the LTMP is to provide a single annual abundance index of pre-recruit eastern king prawn for southern Queensland.

Secondary objectives are to collect data on:

- length of incidentally caught blue swimmer crabs and juvenile snapper
- the occurrence of species of conservation interest (SOCI)
- the abundance of juvenile eastern king prawns from nearshore areas within Deception Bay.
Sites

The survey sites are located within the main eastern king prawn grounds between 24°30'S and 28°S, including Moreton Bay.

Preliminary survey sampling

Preliminary survey sampling sites were selected in shallow inshore areas (Deception Bay). The ten, 0.5 nautical mile sites trawled for the preliminary survey sampling are shown in Figure 1.

Figure 1. Long Term Monitoring Program eastern king prawn preliminary survey sampling sites conducted annually in Deception Bay.
Main survey

Strata were selected at each of four known nursery areas for eastern king prawns (Moreton Bay, Moreton Island, North and South Stradbroke Island and Wide Bay) (Figure 2). Survey strata were defined from historical catch and effort data collected by Courtney et al. (2002). Based on catch information and logistical data gathered during the 2006 pilot survey (DPI&F In Prep.a), two nights of effort were assigned to each of the three southern strata and the smaller Wide Bay strata was assigned one night of effort per trip. One night of effort consists of approximately 20 trawl shots. The total number of sites for the main survey was set at 280 (140 per trip).

Potential trawl sites were spaced evenly throughout the study areas using a 10 x 10 matrix within CFISH 6 minute grids. The designated number of sites are selected randomly from the potential sites in each location stratum. Reserve sites are any of those in the stratum not chosen as a primary site. During the survey, if sites are deemed unsuitable for trawling these sites are replaced with the nearest reserve site in the same location stratum.

Areas and survey strata sampled for eastern king prawns during the main survey are shown in Figure 2.

Figure 2. Survey strata for the 2007 eastern king prawn main survey.
Times

Preliminary survey sampling

The preliminary survey is conducted during one night per fortnight commencing in the first week of September and continues until eastern king prawn are only in small numbers (<30 individuals) in the catch. Sampling days are weather dependant.

Main survey

The main survey commences during the southern trawl closure and continues through the peak fishing period. The first phase starts in the second half of October and the second phase starts in the second half of November. Survey dates are weather dependent.
Monitoring Procedures

Gear and deployment

The beam is deployed at, or towed through the selected site co-ordinates and towed for a half-nautical mile once it has settled on the bottom. However, if the seafloor conditions of the co-ordinates are not practical for trawling, the shot is conducted within two-tenths of a nautical mile (approx 370 m) of the site. Where this is not possible the site is abandoned and replaced by the closest reserve site. Reserve sites are sampled as extra sites where time permits. A trawl must cover at least half of the intended trawl distance for the trawl shot to be considered completed.

Preliminary survey sampling

A departmental vessel specifically set up to tow a small beam trawl in smooth and partially smooth waters is used for the preliminary survey sampling in Deception Bay. This vessel trawls a three metre wide beam with a net of 1½ inch (29 mm) mesh. The net is fitted with a turtle excluder device (50 mm spacings, top opening) with no bycatch reduction device. Ten, half-nautical mile trawls are completed each sampling round.

The net is shot away at a wire length (metres) to site depth (metres) ratio of 5:1. The trawl commences once the net has settled on the bottom (this is confirmed by a slowing of the vessel).

Main survey

The main survey trawls are conducted with towing gear of the following specifications:

- 5 m beam
- 8 mm stainless steel wire warp and briddles
- 3.5 fathom (6.4 m) net (3.5 fathom headline), 1½ inch (38 mm) mesh body and 1¼ inch (29 mm) codend, 8 mm galvanised ground chain, 6 mm stainless steel tickler chain
- net attached to the back of the beam, no sweeps
- codend 100 meshes long by 100 meshes round and
- top opening turtle excluder device (25 mm spacing)
Field procedures

Site data

The shot characteristics recorded for each survey site on the site details datasheet are:

- Session
- Site number
- Start date
- Start time
- Finish time
- Trawl speed (Main survey only)
- Trawl distance
- Depth (Main survey only) and
- Surface salinity

These fields are recorded as per Long Term Monitoring Program and Observer Program: Data Protocol (2005 – onwards) (DPI&F In Prep.b).

Preliminary survey sampling

Once the net is retrieved the catch is spilled from the codend into a plastic tub. All prawns are retained, as identification of eastern king prawn aboard a small vessel is difficult. To avoid the accidental loss of prawns, bycatch that can’t easily be sorted from the catch is also retained and sorted in the laboratory.

At each survey site:

- all prawns from the net are retained
- catch is labelled with session and site number and placed in a plastic bag
- any SOCI species are recorded and released.

In the laboratory all eastern king prawns are identified and carapace length is recorded.
Main survey

At each survey site the catch processing involves:

Eastern king prawns

- identified to species
- recording carapace length

Where the catch of eastern king prawns is too large to be measured in the time between trawl shots, the catch is sub-sampled and the appropriate fields filled out on the datasheet. Where a catch is sub-sampled ~200 individual prawns are measured and the remainder of the catch counted to allow sub-sampling percentages to be calculated.

Other species

- Blue swimmer crabs
  - sex
  - carapace width (as per DPI&F, In Prep.b)
- Snapper
  - fork length (as per DPI&F, In Prep.b)
- SOCI
  - species or species group
  - count.

Where the catch of blue swimmer crabs or snapper is too large to be measured in the time between trawl shots, the catch is sub-sampled and the appropriate fields filled out on the datasheet. Where a catch is sub-sampled 50 individuals are measured and the remainder of the catch counted to allow sub-sampling percentages to be calculated.
Permits and approvals

Permits and permissions

This project requires permits or approval from:

- DPI&F – General Fisheries Permit (*Fisheries Act 1994*).

Survey staff 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, survey dates and methods:

- The Queensland Boating and Fisheries Patrol, DPI&F (Pinkenba, Gold Coast and Hervey Bay)
- Environmental Protection Agency (EPA) (Brisbane office)
- Queensland Parks and Wildlife Service (Brisbane)
- The Harbormaster (Scarborough).

Any interactions with protected species are reported in a timely manner to the appropriate agencies (Department of the Environment and Water Resources, Canberra and/or EPA, Brisbane).

Stakeholders and the general public are kept informed of the survey through a variety of media resources including press releases, pamphlets, reports and web site information, as required in the Assessment and Monitoring Communication Strategy.

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.
References


