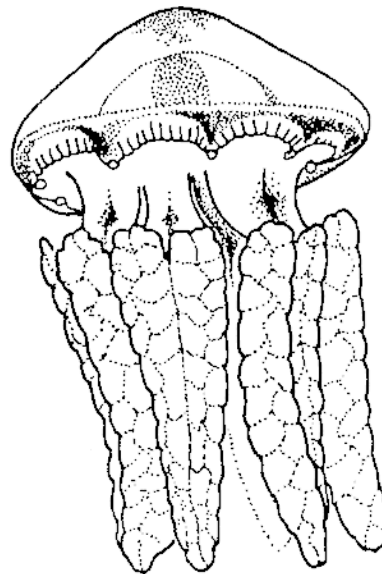


# Ecological Assessment of the Developmental Jellyfish Fishery in Queensland waters

A report to the Australian Government Department of Environment and Heritage on the ecologically sustainable management of the Developmental Jellyfish Fishery.



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## EXECUTIVE SUMMARY

This document has been prepared by the Queensland Department of Primary Industries and Fisheries (DPI&F) as an assessment against the *Guidelines for the Ecologically Sustainable Management of Fisheries* by the Australian Government Department of Environment and Heritage (DEH). Under these guidelines the fishery must satisfy the wildlife export provisions of the *Environment Protection and Biodiversity Act 1999*, before jellyfish product caught in the Developmental Jellyfish Fishery (DJF) can be exported.

The assessment describes the species caught in the Developmental Jellyfish Fishery (DJF), the geographic extent of the fishery and methods used by commercial fishers. It also outlines how the precautionary principle has been exercised in determining management measures and fishing methods employed by operators in the fishery and aim to minimise bycatch, interaction with species of conservation interest and reduce impacts on the environment as a whole. At present, no fishing activity has taken place in this fishery and as such knowledge gaps for the target species and effects on the environment, along with prospective solutions, have been identified.

This report is divided into two objectives based on these guidelines, preceded by an introductory description of the fishery. More detailed descriptions of various aspects of the fishery are presented in the Appendix.

## FISHERIES BACKGROUND

In 1992, Australian Commonwealth, State, Territory and local governments committed to an ecologically sustainable development (ESD) approach for the use of natural resources (COAG 1992). Fisheries resources were (see Green *et al.* 1991) and still are (see Fletcher *et al.* 2003) considered to be one of many specific natural resource foci that fall squarely under the ESD umbrella. The Department of Primary Industries and Fisheries (DPI&F) is the state government agency responsible for the day-to-day management of Queensland's fisheries resources. The DPI&F carries out its management responsibilities under the legislative framework provided by the *Fisheries Act 1994* (the Act). Queensland's commitment to managing fishery resources under ESD principles is embedded in the Act.

The main purpose of the Act is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to both apply and balance the principles of ecologically sustainable development (ESD); and promote ESD. In balancing the principles of ESD, each principle is to be given the relative emphasis appropriate in the circumstances.

To provide an orderly development of new fisheries DPI&F activated a 'Policy Relating to the Establishment and Management of Exploratory and Developmental Fisheries' consistent with the objectives of the Act. Objectives for the exploratory and developmental policy are:

To determine whether or not a potential new fishery is commercially viable, socially acceptable and "ecologically sustainable" as defined in Section 25 (4) of the Act. Examples: *"We believe there is a resource there - can it be harvested with this apparatus or fishing practice?" and/or "We know these species are present, but are there sufficient stocks etc. to support an ecologically sustainable and viable fishery?" or "Is there a more appropriate method of harvesting what is currently harvested by another method?"*

The Queensland DPI&F describes a developmental fishery is as:

- All forms of fishing for a species of fish not presently utilized or considered to be significantly under-utilized, or
- Fishing for a presently utilized fish species using apparatus not permitted by the legislation for that purpose, or
- Harvesting of a fish species or use of prescribed apparatus (or both) in locations where such activities have not previously occurred, or
- Combination of the above with an eventual objective of harvesting such fish.

To prompt continued progress towards ESD, the Commonwealth Government introduced the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999)* and the *Environment Protection and Biodiversity Conservation Amendment (Wildlife Protection Act) Act 2001*. In order for harvested fish species to remain exempt from export controls, fisheries management agencies must demonstrate, through ecological assessment submissions, which their fishery management regimes comply with the objectives of ESD. The Commonwealth Government department currently auditing the fishery management agency submissions is the Australian Government Department of the Environment and Heritage (DEH), unless a state/territory has in place accredited alternative audit processes. All submissions must be based on, and satisfy, the Australian Governments 'Guidelines for the Ecologically Sustainable Management of Fisheries', which are publicly available at <http://www.deh.gov.au/coasts/fisheries/assessment/guidelines.html>. These guidelines cover a number of individual objectives broadly relating to impacts to target species; bycatch and byproduct species; endangered, threatened and protected (ETP) species; ecologically threatened communities; and the marine ecosystem generally.

It is intended that this report serve as the first step in the comment and approval process to include the edible blubber jellyfish (*C. mosaicus*) harvested from Queensland waters, in the list of native species exempt from export restrictions under Part 13(A) of the *EPBC Act, 1999*. It is also the purpose of this document to satisfy the requirements relating to fishery interactions with protected species under the *Wildlife Protection Act, 2001*.

## FISHERY DESCRIPTION

In November 2001 the Department of Primary Industries and Fisheries (know then as Queensland Fisheries Service) produced an information paper on the developmental harvest of the edible blubber jellyfish (*Catostylus mosaicus*). The information paper provided technical, scientific and statistical information to assist the advisory committees and other interested parties on the applications for Developmental Fishing Permits for the Gulf of Carpentaria and Moreton Bay developmental jellyfish fisheries (Information Paper, QFS, 2001). A further information paper was produced providing the same material for applications to commence a developmental jellyfish fishery in Tin Can Bay (Information Paper, QFS, 2002). The Management and Scientific Advisory Committee (MSAC) produced these information papers.

The MSAC comprised of fishery stakeholders, including researchers and representatives from QPWS, CFT and QP&FP and met on a number of occasions, providing significant input into the development of suitable management arrangements if the fishery were to progress past the developmental stage.

| Fishery Profile  |  |
|--|--|
| Target Species   | <i>Catostylus mosaicus</i>   |
| Permitted Species  | None permitted   |
| Size Range   | If a significant portion of catch (>25%) is less than 15cm the fishery area may be suspended or closed.  |
| TACC   | 800 tonnes   |
| Number of General Fisheries Permits Issued (in this Fishery) | 6  |
| Fishery Closure  | 1 <sup>st</sup> June – 31 <sup>st</sup> August   |
| Boats  | No more than 2 (<7 m) per permit   |
| Persons  | No more than 4 acting under direction of the permit holder   |
| Fishery Locations  | Moreton Bay Marine Park waters – excluding the Caboolture River, waters west of the Hornibrook Highway (Pine River), the Logan River, waters south of the southern tip of Russell Island, and all Marine Park Protection Zones and Buffer Zones. |

|                      |   |
|----------------------|---|
|                      | <p>Tin Can Bay and Great Sandy Strait – with the northern limit being a straight line between Urangan, Hervey Bay and Moon Point, Fraser Island.</p> <p>Waters in the Gulf of Carpentaria within Queensland jurisdiction – excluding waters west of 140°E (east longitude).</p> |
| Developmental Period | 3 years   |

## Biology and Ecology

Jellyfish comprise the class Scyphozoa and are members of the phylum Cnidaria along with hydras, sea anemones and corals. *C. mosaicus* is the most common large jellyfish found off the eastern Australian coastline and is the only species in Queensland waters suitable for Asian markets that can be processed cost effectively.

*C. mosaicus* belongs to the edible jellyfish family Rhizostomeae. The eighty species in this family occur worldwide in tropical and subtropical waters with some species found in temperate waters around Australia. Jellyfish from this family are distinguished by the absence of tentacles and the presence of oral arms with deep folds, where food is passed (Barnes 1986). It possesses four oral arms that are dendritically branched on three sides to form a pyramidal mass (Kingsford and Gillanders, 1995). The arms that extend below the umbrella are fused at their base, resulting in the absence of a central mouth. The oral cavity consists of branching channels through the arms to open as hundreds of small mouths in the lower inner portion of the arms. These arms also contain filamentous appendages loaded with nematocysts, used to immobilize prey.

There are two principal stages in the life cycle of *C. mosaicus* - the polyp (benthic, sessile stage) and the medusa (free-swimming stage). Each stage is distinctly different in morphology and ecology. The polyp stage is microscopic and remains hidden within the benthos (Calder, 1982). Once maturation has been reached, the polyp releases free-swimming ephyrae, which rapidly develop into harvestable, adult medusae. These adult medusae can reach a size of 400 mm in bell diameter and weigh between three and four kilograms.

This species is highly fecund and reproduces both sexually and asexually. The medusa stage is the sexually reproducing, dispersal phase having separate sexes. This phase is the only sexual stage of the life history and is important for maintaining genetic diversity. Each female medusa releases between 20 and 40 million eggs that are fertilised externally and unite in the gastric cavity of the female jellyfish (Kingsford and Gillanders 1995).

Fertilised eggs become zygotes and emerge to settle on the oral arms of the adult medusae. Zygotes take four to six hours to develop into free-swimming planulae and after four days, the planulae develop into a sessile polyp form called a scyphistoma. Planulae settle on a variety of natural substrata indicating that they have non-specific settlement preferences. In the absence of preferred sites, planulae have been noted to settle on a variety of other surfaces (Pitt, 2000).

After 15 to 20 days, the scyphistoma settles and attaches itself to a hard substrate on the sea floor. Scyphistomas feed on plankton and grow from autumn to the early summer of the following year. During this period, the scyphistoma reproduces asexually by budding to produce sessile scyphistomae. It is thought this process may be a considerable source of population recruitment (Kingsford and Gillanders 1995).

As the water temperature rises, the scyphistoma alters its asexual reproduction to produce numerous free-swimming offspring called ephyrae. The process of releasing ephyrae is called strobilation. Pitt (2000) found that changes in temperature, salinity and photoperiod did not affect the rate of strobilation in *C. mosaicus*; however polyps did strobilate well after being fed. Rhizostome medusae typically produce no more than six ephyrae per polyp (Pitt, 2000). The ephyrae grow rapidly for three months until the young jellyfish mature into medusae. Figure 1, taken from Pitt (2000), maps out the life cycle of *C. mosaicus*.

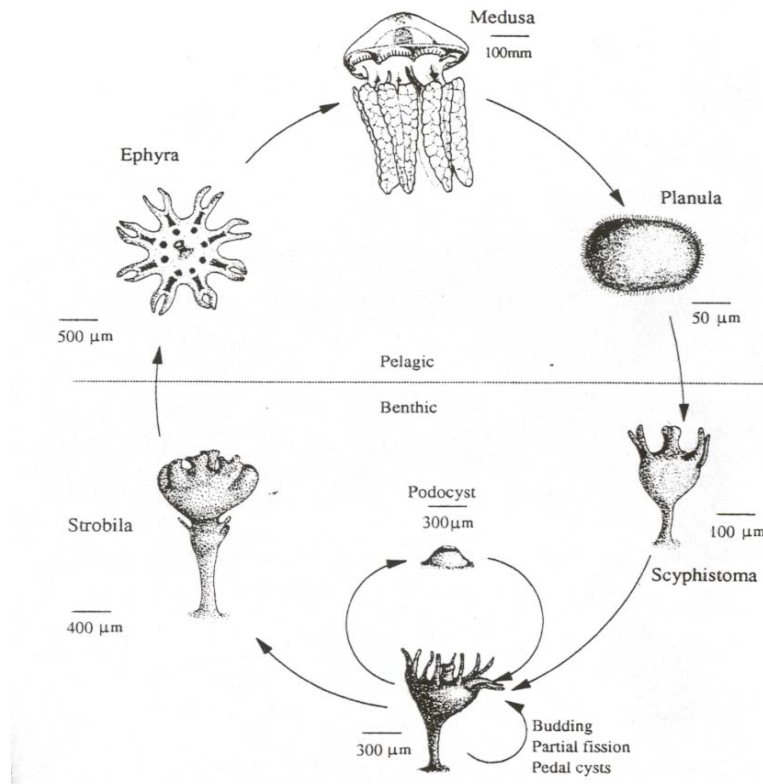


Figure 1: Life cycle of *Catostylus mosaicus*. (Courtesy of Pitt, 2000)

The timing of recruitment in *C. mosaicus* is highly variable, although thought to occur any time between December and July and the level of recruitment may be significantly influenced by environmental conditions (Kingsford and Pitt, 1998). Studies conducted with the New South Wales jellyfish fishery show that *C. mosaicus* medusae do not have distinct spawning episodes but instead produce mature eggs continuously during non-winter periods.

There can also be variation in the reproductive status of medusae within any one location and between separate locations (Pitt and Kingsford, 2000).

The growth of Jellyfish medusae is exceptionally fast. Kingsford and Pitt (1998) found *C. mosaicus* medusae growth to be linear and rapid over the first 50–100 days. Growth of the bell ranges between 27–63 mm per month over the first 100 days. Growth rates tend to slow after 100 days to 13–23 mm per month. It is estimated that *C. mosaicus* ephyrae can grow from 3–10 cm (bell diameter) in one month and to adult size within two months (Kingsford and Pitt 1998). Most individuals of *C. mosaicus* are mature by 16 cm (Kingsford *et al.* 2000). Animals with a bell diameter of 15 cm weigh around one kilogram, with 60% of the weight as tentacles. Medusae with a bell diameter of over 23 cm, weigh in excess of three kilograms.

*C. mosaicus* have a life cycle of one year. The life span of the medusoid phase is generally short-lived and often varies depending on location, but may exceed 10 months (Pitt, 2000). Fluctuations in abundance of medusae are great, partly because the medusoid stage is short-lived (Kingsford *et al.* 2000) and the rate of mortality is likely to be high between strobilation and recruitment of medusae (Grondahl, 1998a; cited in Kingsford *et al.* 2000). Changes in salinity can also affect growth, asexual reproduction and mortality rates of polyps (Kingsford *et al.* 2000).

The diet of *C. mosaicus* is poorly known, although they are adapted to a diet of small organisms or particles of food. The species has been reported to feed on copepods, fish eggs and other planktonic organisms (Dakin 1987). Other species of Rhizostomeae have a noted diet consisting of diatoms,

protozoa, crustaceans, and polychaete worm larvae, pelagic larvae of molluscs, fish eggs, shrimp and shellfish (Cheng 1991). *C. mosaicus* generally feed on food items with a body length not exceeding 3 mm (Georges 1991).

Turtles (particularly leatherback turtles), some bony fishes, crab, sunfish and possibly some birds prey on *C. mosaicus*. Kingsford and Gillanders (1995) noted that it would be hard to establish a direct link between abundance and survivorship of jellyfish predators to the stock size of *C. mosaicus*. Predators such as turtles and sunfish are largely transient individuals, often travelling large distances and are unlikely to depend on localised stocks of *C. mosaicus* for survival.

There is some substantiation to suggest medusae may be used by juvenile finfish for shelter, in particular juveniles from the family Carangidae, thus acting as fish attraction devices. For fishes that are attracted to jellyfish in such a way it is possible that numbers of medusae can influence the year class strength of these species (Hay *et al.* 1990).

## Distribution

*C. mosaicus* is an inshore species distributed ubiquitously along the east coast of Australia from the Torres Strait to Port Phillip Bay, occurring in large numbers during the summer and autumn months.

They have a depth range to 25 m with up to 10% of the species occurring at mid and deep-water levels (Kingsford and Pitt 1998) and have been found to aggregate in estuaries and bays in groups of thousands of individuals. Relatively few individuals are found in between distinct aggregations or in oceanic waters; however it is not yet understood what causes the aggregating behaviour or location preference. The majority of jellyfish observed within a kilometre of the shore are most likely to be *C. mosaicus* (Kingsford and Gillanders 1995).

Aggregations at certain depth levels have been observed, with the jellyfish displaying vertical migration in the water column depending on environmental conditions. During periods of strong wind, heavy rain, strong current and intense sun they move to deeper strata within the water column. Conversely, when the weather is cooler with less wind or waves, *C. mosaicus* commonly aggregate in the water column closer to the surface.

Although *C. mosaicus* has a weak swimming capacity with a swimming speed of 4–5 m per minute, it is capable of maintaining position in bays and inlets. This has implications for management and will be discussed further.

There is currently little scientific information on polyp distribution for *C. mosaicus*, although distribution is believed to be widespread (Kingsford *et al.* 2000).

## Fishery Area and Endorsements

The Queensland Developmental Jellyfish Fishery (DJF) is in a preliminary phase and fishing activity has not yet commenced. At the date of this report, six developmental fishery permits have been issued for the DJF:

- 2 permits have been issued to fish between Tin Can Bay and Great Sandy Strait. The northern limit being a straight line between Urangan, Hervey Bay and Moon Point, Fraser Island.
- 2 permits have been issued for Moreton Bay Marine Park waters - excluding the Caboolture River, waters west of the Hornibrook Highway (Pine River), the Logan River, waters south of the southern tip of Russell Island and all Marine Park Protection Zones and Buffer Zones.
- 2 permits have been issued for waters in the Gulf of Carpentaria within Queensland jurisdiction- excluding waters west of 140°E (east longitude).

The areas covered by the permits (shown in Figure 2) are subject to change during the developmental stage of the fishery. This could happen if, for example, unacceptable interactions occur between commercial DJF fishers and recreational users, other commercial fishers, aboriginal or traditional sites of significance or the environment in general is negatively impacted.

Current locations permitted for developmental jellyfish harvest have taken into account availability and proximity to infrastructure and transport facilities. Jellyfish product requires basic processing prior to export to Asian markets and it is a requirement of entering the fishery that these processing facilities be land based. One of The Moreton Bay permit holders will be using existing beche de mer processing facilities on Stradbroke Island and facilities for both Tin Can Bay and the Gulf locations are being developed to AQIS standards.

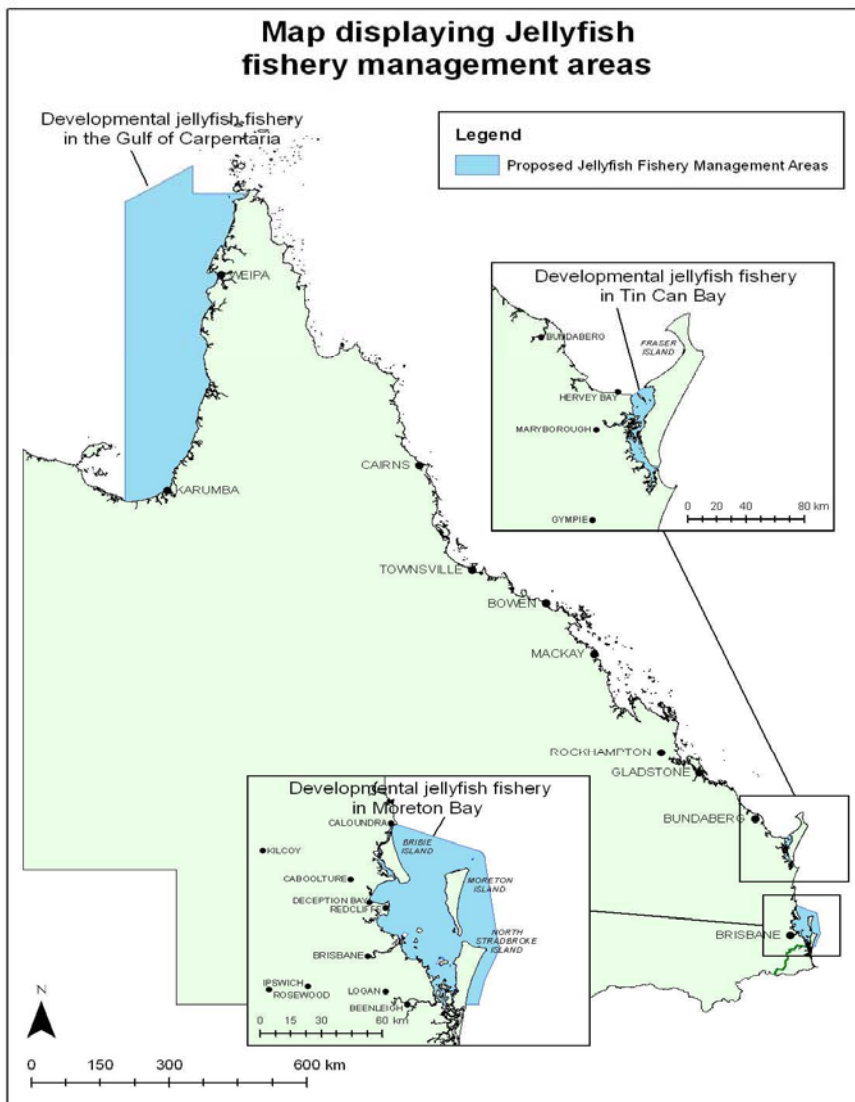


Figure 2 Map displaying the area of Queensland's Developmental Jellyfish Fishery.

## Fishing Apparatus and Methods

The fishing methods and gear used in this fishery are specified in the Developmental Permit Conditions held by each operator (Appendix 1).

The collection apparatus has been restricted to hand held scoop and dip nets with a diameter of no more than 1 meter and mesh size no less than 30mm. Although seine nets have been permitted for herding and corralling jellyfish in other states, it is thought that this would increase the chance of bycatch and juvenile injuries so the use of seine nets has not been permitted in the Queensland DJF.

A maximum of 2 boats of less than 7 metres in length are licensed to operate on each permit. Boat restrictions limit effort in the fishery and reduce boating related impacts on marine habitats within the fishery area. A maximum of 4 persons per permit, acting under the direction of the holder, are authorised to harvest *C. mosaicus* during daylight hours only.

Jellyfish are generally stored whole on board vessels in a salt solution and processed at an approved onshore facility, although some operators will separate the tentacles from the bells at sea.

## Current Management Arrangements

The DPI&F is responsible for generating an information paper, permit conditions and logbook instruction for the management of the developmental harvest fishery for the edible jellyfish *C. mosaicus*. The fishery is managed as a developmental fishery under the "Exploratory and Developmental Fishery Policy", under the legislative framework provided by the Act and the *Fisheries Regulation 1995*.

The successful applicants for this fishery have been granted three-year developmental fishery permits that are flexible enough to alter as progressive research is carried out and further management arrangements become necessary. There are no formal review events for developmental fisheries, however, results from stock assessments and observer programs provide for regular assessment of the appropriateness of management arrangements. Any concerns that arise requiring a change in permit conditions would be implemented through a "show cause" process or a signed declaration of support of these changes by the permit holder/s (Smith, DPI&F, pers comm., 2005). At present, six active permits exist, although fishing activity has not yet commenced.

Management advice on general developmental fishery issues is provided to the DPI&F through the management advisory committee (MAC) for Queensland's harvest fisheries (Harvest MAC). The DPI&F's MAC process provides a consultative forum allowing all stakeholders to provide input into the management of particular fisheries. Harvest MAC representatives include a DPI&F appointed chair, manager, researcher, compliance officer, commercial fishers, recreational fishers and GBRMPA representatives.

In addition to HarvestMAC, the MSAC provides specific advice relating to the DJF. All issues arising from, or of relevance to, the fishery, including any impacts to target, bycatch or protected species, or to the broader marine environment generally, are discussed by the MSAC. The MSAC then advises DPI&F on any management actions required to ensure the fishery continues to operate within sustainable levels.

The permit conditions state that fishing activity for the DJF is confined to distinct bays and estuaries (Fig. 2) with others in the same location being protected. This management approach is similar to the estuary-by-estuary basis of NSW jellyfish fishery (Kingsford and Pitt, 1998). This reduces the risk of impacting overall recruitment and the possibility of local depletion. In line with this management arrangement, individual TACCs have been set for each of the 3 fishery locations within Queensland (summarised in Table 1) and are believed to be significantly precautionary compared to those set for jellyfish fisheries in other states (Table 2).

Table 1 Regional Quota (whole wet weight) for *Catostylus mosaicus* in Queensland waters

| Fishing Area        | Permits Issued | Quota per fisher (t) | Regional Quota (t) |
|---------------------|----------------|----------------------|--------------------|
| Tin Can Bay         | 2              | 100                  | 200                |
| Moreton Bay         | 2              | 100                  | 200                |
| Gulf of Carpentaria | 2              | 200                  | 400                |
|                     |                | <b>TACC</b>          | <b>800</b>         |

Table 2 TACC (whole wet weight) for *Catostylus mosaicus* in Australian waters

| State           | TACC (t) |
|-----------------|----------|
| Queensland      | 800      |
| New South Wales | 1500     |
| Victoria        | 1000     |

At present, the proposed fishery area for the Gulf of Carpentaria DJF lies outside any closed waters under state and commonwealth legislation. The fishing area that lies within the Moreton Bay Marine Park will be managed in accordance with the provisions of *QPWS Marine Parks (Moreton Bay) Zoning Plan 1997*. The Tin Can Bay area of the fishery would be subject to the provisions of the projected Great Sandy Marine Park – Northern Section is implemented. The proposed boundary for the Great Sandy Marine Park- Northern Section is outlined in Appendix 3 (photo courtesy of QPWS).

Compliance of fishing activity with the permit conditions is conducted by the DPI&F Queensland Boating and Fisheries Patrol (QBFP) and permit holders are required to allow inspection of both vessel and processing facilities at any time, without obstruction.

### Progression of Developed Fishery

The progress of a developmental fishery is a step-by-step process:

1. The progress of a developmental fishery is a step by step process, the steps being:  
DPI Fisheries receives an application form, application fee and detailed information on the proposed fishery operation (location, apparatus, market, approximate tonnage sought etc.)
2. DPI Fisheries decides to:
  - proceed with the proposal
  - not proceed with the proposal
  - or request more information on the proposal from the applicants
3. If the DPI Fisheries proceed with the proposal, the DPI Fisheries produces an information paper about the proposed fishery(ies).

The information paper is advertised for public comment and new interested parties can submit an application.

Public comments are collated and applicants are given the opportunity to assess them and provide further comment to DPI Fisheries.

4. A Management and Scientific Advisory Committee (MSAC), established by DPI Fisheries and consisting of scientists, compliance officers and other relevant persons, meet to review the proposal and all relevant information. MSAC makes a recommendation to DPI Fisheries on whether or not the fishery should proceed and if so, what conditions should be place on any future permits issued to applicants.

DPI Fisheries decides whether or not to go ahead with the developmental fishery, taking into account all available information and the MSAC's recommendation.

5. Successful applicants must submit a detailed fishing plan.  
DPI Fisheries decides which applications are successful.  
Successful applications must proceed through the Native Title notification procedure (approx 6 weeks)
6. Permit is issued. The successful applicant(s) are consulted with to finalise permit conditions and management arrangements for the fishery. See Developmental fisheries applications & permits at <http://www.dpi.qld.gov.au/fishweb/12525.html>

Successful developmental fisheries then operate for 3 years while an assessment is made on the future sustainability and viability of the operation, taking into account the Observer Program information and other scientific stock assessments.

7. After 3 years of operation, DPI Fisheries decides whether the fishery is viable or not. The 3-year period maybe extended by DPI Fisheries to determine the viability of the fishery.  
If viable, DPI Fisheries prepares a Management Plan, seeks legislative changes, selects operators and begins a management program.

At the end of the developmental period all available information relevant to an assessment of the stability and sustainability of the fishery will be made available to the public. Progress of the fishery to "developed" status can be achieved only by amendment to the Regulation and would only proceed following consideration by DPI&F as required under the Act. The DPI&F will ordinarily grant preferential consideration to the developers.

If the DPI&F finds the DJF can progress as a sustainable fishery that complies with ESD principles, appropriate management arrangements will be developed after public and stakeholder consultation.

#### The Indigenous; Recreational and Charter Sectors

There is no information available on the indigenous, charter or recreational harvest of the edible blubber jelly *C. mosaicus*. *C. mosaicus*, however it is not known to be taken by these sectors as it is of low value and it is not able to be consumed without first being subject to specialised processing.

#### Other Resource Users

From the outset, it has been proposed that jellyfish fishing activities in Queensland waters be conducted within defined locations to avoid conflict with other fishers as much as practicable. Other sectors likely to be utilizing these areas include other developmental fisheries, commercial, recreational and traditional fishers, recreational boaters and tourists. Fishing activity for the DJF is yet to start; thus, there has been no conflict between these users to date.

Due to the small number of holders in each proposed fishery location, significant conflict between permit holders and other resource users is not anticipated.

#### Environmental Impacts of the Developmental Harvest Fishery for *C. mosaicus*

At the expiry of the developmental phase, the fishery will be assessed with regard to factors including fishing method, catch and effort. At this early stage in its development it is envisioned the fishery will have limited impact on regional marine ecosystems. Information from jellyfish harvest fisheries elsewhere indicates that the harvesting method is highly selective and is believed to retain few incidental species and pose no threat to endangered, threatened or protected species. Jellyfish harvesting occurs on the surface of the water only and fishing will not affect any benthic communities. Anchor damage to benthic communities is presumed to be minimal due to the low number of DJF fishing boats in these areas relative to boating activity from various other users.

Although impacts of the developmental jellyfish fishery on the broader ecosystem are at this point largely unknown, the primary impact arising from the DJF would be removal of the target species from the food chain. *C. mosaicus* is known to be a food source for some bony fishes, crabs, sunfish and turtles. The DJF is, however, not anticipated to have a significant effect on these prey species due to the small scale of this fishery.

### Research and Monitoring Program

Due to the current low level of economic importance, there has been a relatively small level of research effort into this fishery so far. Establishing whether commercial quantities of jellyfish exist in Queensland waters will rely upon initial data collection by DPI&F onboard observers and quota monitoring during the developmental phase. These data will also indicate whether the fishery can sustain commercial harvesting, and at what level, while protecting the long-term viability of jellyfish stocks. Subsequent monitoring programs will need to be specifically designed in order to deliver the necessary fundamental management information.

Queensland's Developmental Fishery Policy specifically requires that all information collected under a developmental fishery is available to the DPI&F. Further, DPI&F personnel or other approved independent "observers" are required to be accommodated and facilitated on board vessels by the approved participants for the purpose of observing and reporting on their developmental fishing operations. Research personnel will need to have access to vessels, records and product to undertake this monitoring. Accordingly, a condition of access to the DJF will be an agreement between the fisher and DPI&F to provide assistance and cooperation.

DPI&F will be remunerated by the approved fishery participants for any service they provide to the holder (including administering an observer program and research and monitoring associated with stock assessments) as required under permit conditions. However, the permit holders are free to employ external parties to undertake these tasks, so long as such parties receive approval from the Chief Executive, DPI&F.

### Export Potential

Dried jellyfish is a popular food item in many Asian countries, especially in Japan where it is considered a delicacy. Thailand, Malaysia and China currently meet most of the market demand for jellyfish, however, higher demand, combined with decreasing catch rates and increasing pollution in Asian waters, has led to an interest in harvesting and exporting jellyfish from Australian waters (Information Paper, QFS, 2002)

The main market for jellyfish product from Queensland waters is the existing Asian markets plus a limited domestic market to Asian supermarkets.

Fully processed and consumer ready product can attract up to AUS\$70 per kg, however Queensland applicants only have the capacity to partially process product in a dehydrated form with a wholesale value between AUS\$5 - \$10 per kg (Smith, DPI&F, *pers. com.* 2005).

As the drying process reduces the wet weight to one-tenth of its wet weight, holders with a 100 tonne quota have the potential to earn approximately AUS\$50K-\$100K per year.

Some applicants have shown an interest in value-adding through the development of products from the tentacles such as nutritional supplements and as a source for aquaculture feeds, although at this stage, Queensland operators do not have the ability to process tentacles.

## **ECOLOGICAL ASSESSMENT OF THE DEVELOPMENTAL JELLYFISH FISHERY AGAINST PRINCIPLE 1.**

**A FISHERY MUST BE CONDUCTED IN A MANNER THAT DOES NOT LEAD TO OVERFISHING, OR FOR THOSE STOCKS THAT ARE OVERFISHED, THE FISHERY MUST BE CONDUCTED SUCH THAT THERE IS A HIGH DEGREE OF PROBABILITY THE STOCK(S) WILL RECOVER.**

### **OBJECTIVE 1.**

**THE FISHERY SHALL BE CONDUCTED AT CATCH LEVELS THAT MAINTAIN ECOLOGICALLY VIABLE STOCK LEVELS AT AN AGREED POINT OR RANGE, WITH ACCEPTABLE LEVELS OF PROBABILITY.**

### **Information requirements**

**1.1.1 There is a reliable information collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon an appropriate mix of fishery independent and dependent research and monitoring.**

#### **Fishery-dependent information**

The DPI&F maintains a range of data collection systems for providing up to date information on fish stocks, species taken as well as the level and distribution of fishing effort and fish catches. This information is used by fisheries managers to aid decisions about maintaining sustainable harvests of principle species and ensuring the objectives of the *Fisheries Act 1994* are met. This information is also used by researchers in making scientific assessments about the status of these species and by analysts monitoring and interpreting spatial and temporal changes and trends in fishing activity and catch levels.

A comprehensive compulsory daily logbook program for Queensland's commercial fisheries was introduced in 1988 where they were introduced primarily as a performance and compliance tool for fisheries. Prior to this, catch and effort data from specific elements of the fishery were collected as part of short to medium term individual research projects. The Commercial Fisheries Information System (CFISH) database was also established in 1988 to manage the large inflow of data from fishers and to provide access to fishery dependent data for fisheries research and management.

When the commercial developmental jellyfish fishery commences, the daily Commercial Fisheries Logbook Program will be the principal data collection program. Valid logbook entries are to be recorded daily and reported to DPI&F logbook section after every fishing week. The draft logbook for this fishery is currently being designed to collate information from each permit on effort - including hours of collection and number of collectors; location- using 30 minute grid locations; and catch - including bin size, number and product form for example: whole wet weight or bell weight and tentacles. This information will then be entered into the CFISH database system, allowing for the analysis of catch and effort in the fishery to help evaluate the effectiveness of management arrangements. Refer to Appendix 2 for the draft version of the DJF logbook.

An independent observer program will also be established upon commencement of the jellyfish fishery, which will collect information on fishing operations and any environmental impacts associated with the fishery. This includes information on collection methods, processing techniques, commercial discards and any damage occurring to the broader marine environment due to fishing activity. The observer program will validate logbook records and assesses compliance with permit and legal size conditions as well as addressing any other issues that may arise due to the operations of the fishery

The permit holder is also required to contact the QBFP prior to commencing authorised activities advising on the length of trip and persons involved in the take of jellyfish as per permit condition 16. This allows the DPI&F to monitor fishing effort and activity within the delineated fishing areas and compliance with permit conditions.

### **Data Validation**

As a condition of entry into this fishery the holder is responsible for the provision of an observer independent of the fishery. The observer program involves a fisheries observer attending a minimum of 10 fishing trips annually to monitor the harvest and processing operations of the fishery. The observer program will provide data on jellyfish distribution and abundance, population structure and environmental variables, supplying the DPI&F with greater understanding of the operation of the fishery and ultimately allowing more effective management. The observer program also provides an independent record of fishing, enabling DPI&F to assess the accuracy of the detailed fishery-dependent data collected in the CFISH logbook program.

### **Fishery dependent data reliability**

Logbook information is inherently reliant on the honesty of the operator; however, it is a condition of permit to provide logbook information as defined by the DPI&F as well as implementing an onboard observer program. Commercial operators in this fishery are committed to ensure compliance with fisheries regulations and due to the fact that there are only a small number of permits issued for this fishery, the capacity to monitor compliance and detect discrepancies is quite high. The DPI&F Logbook Section investigates any discrepancies in commercial catch information provided by fishers to ensure data reliability. Enforcement officers from the Queensland Boating and Fisheries Patrol assist the verification process by follow-up investigating of abnormal catch and logbook entries when they undertake fishing vessel inspection during surveillance patrols.

### **Fishery-independent information**

Due to the developmental nature of this fishery, there is currently no fisheries independent data available.

### **Recreational and Indigenous information**

This fishery will solely be a commercial fishery and at present has no significant recreational or charter interest. There is currently one approved permit with an Indigenous commercial interest (the Nunukal Ngugi Cultural Heritage Corporation) for the Moreton Bay fishery area.

## **Assessment**

**1.1.2 There is a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and /or reproductive capacity. Review should take place at regular intervals but at least every three years.**

There is currently no formal stock assessment model for this fishery. At the time of writing the developmental jellyfish fishery has not commenced and no catches have been reported. Each permit holder is, however, required to conduct an annual survey of jellyfish (*C. mosaicus*) stocks in their fishery area. Written approval for survey methodology, aims and objectives is required from the Chief Executive, DPI&F prior to commencement. Surveys are to be conducted annually between 1<sup>st</sup> November and 31<sup>st</sup> March with results being received by the Chief Executive, DPI&F no later than 1<sup>st</sup> July each year.

The data collected from these stock assessments will be validated against logbook information and data gained from the observer program. Again, due to the limited number of permits in this fishery, any increase/ decrease in target species catch rates will be easily identified and management actions altered to accommodate this.

**1.1.3 The distribution and spatial structure of the stock(s) has been established and factored into management responses.**

*C. mosaicus* has an extensive inshore distribution along the east coast of Australia and occur in aggregates of large numbers during the summer months. Although there has been no fishing and research instances as yet and little information available on populations of this species of jellyfish specific to Queensland waters,

*C. mosaicus* inhabit the water column from the surface to a depth range of approximately 25 metres, and are known to display vertical migration depending on weather conditions. Up to 10% of the population occurs in mid-deep water levels (Kingsford and Pitt, 1998). The fishing gear and collection methods employed are highly selective and only individuals at the surface of the water column are taken, which ensures a certain level of stock protection.

Further research into the spatial structure of jellyfish stock in Queensland waters may lead to more area specific management arrangements in the future.

Due to the ability of *C. mosaicus* to maintain position within a relatively sheltered area, jellyfish fisheries set up in other states have suggested that, for management purposes, individual estuaries and bays be treated as separate fishing zones (Hudson *et al*, 1997). The three areas in Queensland where General Fishing Permits have been issued to instigate developmental jellyfish fisheries are: Tin Can Bay, Moreton Bay and the Gulf of Carpentaria. These regions are geographically separate and recognising TACCs set for *C. mosaicus* in other Australian states, the DPI&F have set precautionary Total Quota for each geographic region which, when combined, equate to the total TACC for Queensland.

**1.1.4. There are reliable estimates of all removals, including commercial (landings and discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.**

Commercial fishing activity for this fishery is due to commence as at September 2005, therefore, no catch has been recorded or stock assessment completed at the time of writing.

DPI&F will ensure that future stock estimates take into account the best available information from the DJF logbook (Appendix 2), DPI&F observers and quality assured surveys. It is anticipated that these estimates will be reliable and robust as the Developmental Fishery Policy specifically states that all information collected under a developmental fishery program is available to the DPI&F and a condition of access to the fishery is an agreement to provide assistance and cooperation to DPI&F and independent researchers.

It is a requisite of the general fisheries permit holder for this fishery to maintain compulsory logbooks documenting catch and effort for each year. Information that is received from mandatory logbooks will be maintained in the CFISH database. The permit holder is also responsible to provide an annual survey of the stock and onboard access for DPI&F observers for a minimum of 10 fishing days per year (Appendix 1, permit condition 13). Once obtained, the information will be used by the DPI&F to determine the sustainability, commercial viability and social acceptability of this new fishery.

*C. mosaicus* is unlikely to be taken by recreational, charter or indigenous fishers nor is this species retained as a byproduct in other fisheries.

On occasion, this species can be a significant bycatch component in the mud crab pot fishery in Moreton Bay. Although seasonal incidental catch of *C. mosaicus* is likely to occur in other inshore commercial fisheries, particularly at times of peak stock density, the numbers of incidental catch taken is considered by the DPI&F to have no significant effect on commercial stocks due to the high fecundity and wide distribution of this species.

The current TAC for each fishery area has been set at a precautionary level with specifications written into the developmental permit that allows this to be revised subject to further research.

**1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.**

As there has been no fishing activity to date, there are currently no estimates of potential productivity of Queensland's *C. mosaicus* stock. Accordingly, the total allowable quota set for each geographical fishing region (Table 1) has been set at a precautionary level relative to TACCs imposed on jellyfish fisheries in other Australian states (Table 2).

Areas of future research identified by the DPI&F as necessary to accurately assess the jellyfish resources in Queensland include:

- Estimating the biomass of jellyfish stocks
- Determining sustainable annual harvest levels of jellyfish
- Determining biological and ecological aspects of *C. mosaicus*, in particular
  - population dynamics- such as the timing and duration of reproduction
  - population growth and
  - factors influencing jellyfish survival and fecundity (Information Paper, QFS, 2002)

**1.1.6 There are reference points (target and/or limit) that trigger management actions including a biological bottom line and/or a catch or effort upper limit beyond which the stock should not be taken.**

Although it is recognised that both target and limit reference points are important triggers in fisheries management to ensure the long- term viability of stock is not being compromised, there is currently no information on the population dynamics of *C. mosaicus* in Queensland waters and consequently, robust reference points have not been developed (Information Paper, DPI&F, 2002).

The Total Allowable Commercial Catch (TACC) limit set for this fishery is a highly conservative estimate and will serve as a proxy reference point until research information collected during the initial developmental period, both fisheries- dependant and -independent, serves to allocate duly reliable reference points.

The annual survey of the fishery, required under the permit conditions, should provide further assurance that the TACC is suitably conservative.

Should the fishery progress beyond the developmental phase, a formal process within the framework of the DPI&F developmental fishery policy will be undertaken to prescribe management arrangements, including extensive public and stakeholder consultation. The development of appropriate reference levels will be discussed as part of that process.

**1.1.7 There are management strategies in place capable of controlling the level of take.**

**General management arrangements affecting the sustainability of *C. mosaicus***

The *Fisheries Act 1994* provides the overarching objectives for the management of the developmental jellyfish fishery, as it does for all Queensland fisheries, specifying that:

- 1) The main purpose of the *Act* is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to:
  - a) apply and balance the principles of ecologically sustainable development and
  - b) promote ecologically sustainable development
- 2) In balancing the principles, each principle is to be given the relative emphasis appropriate in the circumstances.

Permit Condition 6 states that a DPI&F officer will standardise bin volume to weight conversions within the first 6-10 fishing events, for the purpose of monitoring the harvest weight against the

TACC. Management arrangements for the fishery also specify the type and quantity of equipment permit holders may use; requirements to allow observers on any fishing trip, or processing facility, for a minimum of 10 days per year and the requirement to keep an accurate daily logbook. All management controls are listed in the permit conditions in Appendix 1 and summarised in Table 3, below.

Table 3 Summary of the management arrangements in the Developmental Jellyfish Fishery.

| Management Measure/ issue         | TIN CAN BAY/<br>GREAT SANDY<br>STRAIT   | MORETON BAY   | GULF of<br>CARPENTARIA  |
|-----------------------------------|---|---|---|
| Number of Permits                 | 2   | 2   | 2   |
| Permit Duration                   | Both:<br>11 May 2005 to<br>10 May 2008  | 29 June 2005 to<br>28 June 2008<br><i>and</i><br>17 July 2005 to<br>16 July 2008  | 21 July 2005 to<br>20 July 2008<br><i>and</i><br>1 still to be issued   |
| Closed Season                     | 1 June to 31 August   | 1 June to 31 August   | 1 June to 31 August   |
| Additional Management Authorities | None presently-<br>QPWS Marine Parks<br>will have<br>responsibility when<br>the Great Sandy<br>Marine Park is<br>implemented                      | QPWS Marine Parks,<br>Moreton Bay   | None  |
| TACC                              | 200 tonnes<br>(100 t per permit)  | 200 tonnes<br>(100 t per permit)  | 400 tonnes<br>(200 t per permit)  |
| Apparatus                         | Hand held dip nets:<br>Not more than 1m<br>diameter;<br>Mesh size no smaller<br>than 30mm   | Hand held dip nets:<br>Not more than 1m<br>diameter;<br>Mesh size no smaller<br>than 30mm   | Hand held dip nets:<br>Not more than 1m<br>diameter;<br>Mesh size no smaller<br>than 30mm   |
| Stock Assessments                 | To be undertaken by<br>holder annually,<br>between 1 Nov and<br>31 Mar (same month<br>each year) and<br>submitted by the 1 <sup>st</sup><br>July. | To be undertaken by<br>holder annually,<br>between 1 Nov and<br>31 Mar (same month<br>each year) and<br>submitted by the 1 <sup>st</sup><br>July. | To be undertaken by<br>holder annually,<br>between 1 Nov and<br>31 Mar (same month<br>each year) and<br>submitted by the 1 <sup>st</sup><br>July. |

### Output Controls

A range of output controls is in place to protect the target species harvested. These include:

- if a significant proportion of the catch (>25%) is juvenile animals (of less than 5cm bell diameter), consideration will be given to the suspension or closure of the fishery in the area of operation (permit condition 4).
- the implementation of a Total Allowable Commercial Catch (TACC) where a maximum of 800 tonnes (whole wet weight) of *C. mosaicus* is allowed to be taken in Queensland waters in any year.

It is standard DPI&F practice in all quota-managed fisheries that quota holders (the permit holder in the case of this fishery) are sent a letter of notice when 25% and 10% of their quota is remaining. Actions to control the catch to within the TACC limit are enacted under the s.27 of the *Fisheries Regulations 1995* (Notice of filling of certain quotas) which states:

- a) When the Chief Executive becomes aware that a quota (other than a daily or time quota) has been, or is likely to be, filled on or by a particular day, the Chief Executive must immediately notify a relevant authority holder, in writing, that the quota has been, or is likely to be, filled by a stated day.

- b) The authority holder must immediately tell persons acting under the authority that the quota has been, or is likely to be, filled on or by the stated day.
- c) A person given notice under subsection (1) or (2) must not take fish to which the notice relates after the day stated in the notice or, if the stated day has passed, the day after the notice is received.

### **Input controls**

*Seasonal closure:* the target species cannot be taken during the winter months (1<sup>st</sup> June to 31<sup>st</sup> August) as there is a known reduction in numbers and sizes. The majority of adults have, by this time, reproduced ensuring recruitment for the following year is sustainable.

*Limited entry:* 6 permits have been issued in Queensland, with only 2 permit holders harvesting in each geographically separated area.

*Vessel restrictions:* a maximum of 2 boats, less than 7 metres in length, are allowed to participate in fishing activity for each permit holder. Effort on board vessels is also restricted to no more than 4 persons taking the permitted species at any one time, acting under direction of the permit holder.

*Gear restriction:* harvesting of *C. mosaicus* is by hand held scoop or dip netting only and size and mesh restrictions apply to these: nets must be no more than one (1) metre in diameter and the mesh size is to be less than thirty (30) mm. Restricting harvesting methods to dip and scoop nets targets only those medusae near the surface, protecting up to 10% of the population which occur at mid to deep echelons within the water column.

*Restricted areas:* commercial access to the resource in all areas outside the specified jellyfish fishing areas under permit are restricted which allows for undisturbed reproduction and re-population from other aggregations.

### **Compliance**

As commercial fishing activity has not yet commenced, no compliance information is available. The small number of permits issued, the stringent conditions and notification procedures that apply to permit holders are expected to enhance compliance in the fishery. It is conditional for permit holder to inform the Queensland Boating and Fisheries Patrol (QB&FP) and the observer, of impending fishing activities prior to commencement.

At this point the Queensland jellyfish fishery is a developmental fishery, but DPI&F has the capacity to alter the management arrangements at any time should such an action be deemed necessary to ensure sustainability of the target species, including to facilitate compliance with permit conditions.

#### **1.1.8 Fishing is conducted in a manner that does not threaten stocks of byproduct species.**

It is a permit condition for holders in the developmental jellyfish fishery to “ensure that all fish taken unintentionally during permitted activities are returned to the water as soon as practicable and with as little harm or injury as possible”

The proposed gear (dip and scoop nets) used in the developmental jellyfish fishery is highly selective and it is considered highly unlikely other species will be taken during authorised fishing activity. It is expected that fishers will record species caught other than the target species, while conducting authorised activity. DPI&F will implement a precautionary approach to the management of byproduct species if deemed necessary.

**1.1.9 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.**

The DPI&F believe that the precautionary management arrangements, set out under the general permit conditions for the fishery are reasonable and sufficiently responsive to ensure ecologically sustainable development of this resource.

The small number of permits issued; conservative, area-specific TACCs and proposed mandatory, seasonal closures should promote fair access consistent with the current level of interest in the resource and a responsible, measured approach to economic development of the fishery. Reporting procedures will assist the detection of trends in the catch of target and bycatch species, thus providing information for management to ensure that the fishery impacts are sustainable. These reporting procedures include:

- Compulsory daily logbook entries
- Onboard observer data
- Prior reporting of fishing activity, and
- Requirement for permit holders to complete an annual stock survey

## OBJECTIVE 2.

**WHERE THE FISHED STOCK(S) ARE BELOW A DEFINED REFERENCE POINT, THE FISHERY WILL BE MANAGED TO PROMOTE RECOVERY TO ECOLOGICALLY VIABLE STOCK LEVELS WITHIN NOMINATED TIMEFRAMES.**

### Management responses

**1.2.1 A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should apply until the stock recovers, and should aim for recovery within a specific time period appropriate to the biology of the stock.**

and

**1.2.2 If the stock is estimated as being at or below the biological and / or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.**

Studies for the NSW jellyfish fishery conducted by Kingsford and Gillanders (1995) found jellyfish to be remarkably resilient to exploitation due to their short life span and high fecundity.

With this in mind, together with the limited number of permits issued and limited time span that permits are issued for, it is unlikely that the Queensland *C. mosaicus* stocks would be at risk of decline below ecologically viable levels.

Additionally, the fishery will only be conducted within defined locations. As suggested in the assessment of the NSW jellyfish fishery (Kingsford and Pitt, 1998), this maintains the stock in other bays and estuaries and significantly reduces the chance of overfishing the target stocks due to repopulation from areas that aren't fished.

In association with the current management arrangements, DPI&F has various general mechanisms available under the *Fisheries Act 1994* to respond in a timely manner to threats on the sustainability of the fishery. In the unlikely event that stocks are assessed as overfished or below an ecologically sustainable reference point at any given fishery location, the permit holder can be requested to "show cause" why the permit should not be suspended or revoked and emergency fishery declarations can be made under the powers contained in the *Fisheries Act 1994*. These include power to:

- a) declare a closed season, closed waters or no take of species (section 43 of the Act);
- b) declare quota (section 44 of the Act);
- c) make an emergency fisheries declaration (section 46 of the Act) where urgent action is needed to meet a significant threat to fisheries resources or habitat;
- d) refuse to issue or renew an authority (section 59 of the Act) where it is necessary or desirable for the best management or protection of fisheries resources;
- e) impose conditions on issue or renewal of an authority (section 61 of the Act);
- f) amend an authority through a 28-day 'show cause notice' (section 63 of the Act); and
- g) amend an authority by written notice (section 63 of the Act) – where the quota is to be changed.

Measures are also in place, through permit condition 4, enabling the suspension or closure of a fishery area if the catch comprises greater than 25% juveniles (<15cm bell diameter). This reduces the risk of overfishing for non-retained juveniles of the target species.

## **ASSESSMENT OF THE DEVELOPMENTAL JELLYFISH FISHERY AGAINST PRINCIPLE 2.**

**FISHING OPERATIONS SHOULD BE MANAGED TO MINIMISE THEIR IMPACT ON THE STRUCTURE, PRODUCTIVITY, FUNCTION AND BIOLOGICAL DIVERSITY OF THE ECOSYSTEM.**

### **OBJECTIVE 1.**

**THE FISHERY IS CONDUCTED IN A MANNER THAT DOES NOT THREATEN BYCATCH SPECIES.**

Generally, bycatch includes all non-retained catch, (released alive or discarded dead) as well as individuals that are impacted by the fishing gear but are not landed (Alverson *et al* 1994; Harris and Ward 1999). While bycatch obviously includes non-target species that are incidentally caught, target species that are caught and released (including individuals below the minimum legal size) are also considered bycatch.

### **Information requirements**

#### **2.1.1 Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch including discards.**

The DPI&F do not anticipate a significant amount of bycatch from the developmental jellyfish fishery as the large mesh size of the gear and methods used are extremely selective, enabling bycatch to be avoided. It is believed that the observer program will provide reliable information of any bycatch species, providing the appropriate information for the management agency to assess the risk the fishery exerts on any bycatch species.

Permit holders in the DJF are required (under permit condition 13) to provide an independent person authorised by the Chief Executive to observe and report on operations related to the management of the developmental jellyfish fishery for a minimum of 10 days per year. If any species other than the target species is found to be taken during the developmental phase of the fishery, management will, in an appropriate timescale, assess the fishery's impact on such species.

### **Assessments**

#### **2.1.2 There is a risk analysis of the bycatch with respect to its vulnerability to fishing.**

As there has been no fishing activity to date, no analysis of bycatch with respect to its vulnerability to fishing activity has been conducted. When information on bycatch in the DJF does become available, a risk assessment will be scheduled. Information collected as described in 2.1.1 will lend considerable support to any bycatch risk assessment that is undertaken by the DPI&F.

### **Management responses**

#### **2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.**

The outcomes of developmental commercial jellyfish fishery surveys in Northern Territory, New South Wales and Victorian waters resulted in the restriction of gear to scoop and dip nets, with some states allowing seine nets for herding and corralling purposes only. From the information in these surveys, the mesh size for scoop/dip nets has been set at no smaller than 30mm to allow for juvenile target

species to escape. The large mesh size also prevents the incidental capture of juvenile finfish as Hey *et al* (1990) suggested that jellyfish might act as fish attraction devices for some species of juvenile finfish.

As stipulated in permit condition 5, it is mandatory that the holders ensure any fish taken unintentionally are returned to the water with as possible to reduce potential harm or injury.

**2.1.4 An indicator group of bycatch species is monitored.**

and

**2.1.5 There are decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers.**

and

**2.1.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.**

Due to the developmental nature of this fishery and the fact that fishing activity has yet to commence, there is insufficient data available with which to set bycatch reference points or identify indicator groups. It is unlikely, however, that indicator groups will be an effective strategy for monitoring bycatch in the jellyfish fishery due to the high selectivity of gear and limited interaction with bycatch.

The current management arrangements (permit conditions which can be modified) together with the mandatory, independent observer program are considered significantly responsive to highlight any significant risks to potential bycatch species.

If necessary, a need for indicator species and decision rules will be reviewed once the fishery has commenced and fishery monitoring has been conducted. With the available information, DPI&F currently considers that there are unlikely to be species significantly impacted as bycatch within this fishery.

## OBJECTIVE 2.

**THE FISHERY IS CONDUCTED IN A MANNER THAT AVOIDS MORTALITY OF, OR INJURIES TO, ENDANGERED, THREATENED OR PROTECTED SPECIES AND AVOIDS OR MINIMISES IMPACTS ON THREATENED ECOLOGICAL COMMUNITIES.**

### Information requirements

#### **2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities.**

Along with completing compulsory daily catch and effort logbooks, under the direction of the Logbook Requirements, all permit holders are to keep and give logbook returns related to interactions with species of conservation interest in the Species of Conservation Interest (SOI) logbooks (Appendix 4). Although an interaction with endangered, threatened or protected (ETP) species is unlikely to occur (refer to Table 4), should this happen, the interaction will be detailed in the SOI logbook as well as noted in the general fishery logbook (Appendix 2).

Collection of this information will be validated by regular observer trips and any interactions reported will be brought to the attention of the Harvest MAC to provide advice for an appropriate management response.

### Assessments

#### **2.2.2 There is an assessment of the impact of the fishery on endangered, threatened or protected species.**

It is known that *C. mosaicus* is a major dietary source of some marine turtle species (e.g. flatbacks) and aggregates in forage areas of other turtle species (e.g. loggerhead and green). There is slightly increased risk of interaction of three species with this fishery (Table 4) due to commercial DJF boating activity specifically targeting areas of high jellyfish density, which may increase the likelihood of a turtle interaction. These turtle species do not exclusively rely on *C. mosaicus* as a food source and as such the DJF is considered to have minimal effect on turtle feeding due to the restricted areas where jellyfish are allowed to be taken. However, if the DJF progresses past the developmental phase, the DPI&F have identified assessing of the impacts this fishery may have on turtle feeding as a research priority.

Potential impacts to ETP species from the DJF are more likely to be restricted to interactions with vessels. The DPI&F acknowledges that the fishery operates in areas where turtles and dugongs are present. However, only two permits are to be issued for each fishery location and fishing operations will be excluded from Marine Park Zones in the Moreton Bay Marine Park and the proposed Great Sandy Marine Park- Northern Section. Consequently the incidental risks to ETP species from the DJF is expected to be negligible.

#### **2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities.**

There are no known threatened ecological communities in DJF locations. As jellyfish are only taken from the surface of the water column using dip or scoop nets, no interactions with threatened ecological communities are likely to occur.

The most likely impact would be possible benthic disturbance from vessel anchors and moorings, however, only 2 permits so far have been requested for each fishery location and disturbance to benthic communities would be considered to be negligible.

Table 4 List of marine fish, reptile and mammal species of conservation interest that may occur in the DJF areas.

| Common name                         | Species                        | IUCN Listing | Commonwealth Legislation (EPBC Act) | Queensland Legislation (Nature Conservation Act and Fisheries Act) | Likelihood of species interaction with the DJF |
|-------------------------------------|--------------------------------|--------------|-------------------------------------|--|--|
| <b>Fish and Sharks</b>              |                                |              |                                     |  |  |
| Humphead Maori Wrasse               | <i>Cheilinus undulatus</i>     | EN           |                                     | Regulated by species <sup>1, 4</sup>                               | Remote   |
| Grey Nurse Sharks                   | <i>Carcharias taurus</i>       | VU           | CE                                  | EN <sup>3</sup> / Regulated by species <sup>2, 4</sup>             | Remote   |
| Great White Shark                   | <i>Carcharodon carcharias</i>  | VU           | VU, LOMS                            | Regulated by species <sup>2, 4</sup>                               | Remote   |
| Whale shark                         | <i>Rhinocodon typus</i>        | VU           | VU, LOMS                            |  | Remote   |
| Freshwater sawfish                  | <i>Pristis microdon</i>        | EN           | CE                                  |  | Remote   |
| Green sawfish                       | <i>Pristis zijsron</i>         | EN           |                                     |  | Remote   |
| Smalltooth sawfish                  | <i>Pristis pectinata</i>       | EN           |                                     |  | Remote   |
| Knifetooth sawfish / narrow sawfish | <i>Anoxypristis cuspidate</i>  | EN           |                                     |  | Remote   |
| Speartooth shark (Glyphis sp)       | <i>Glyphis glyphis</i>         | EN           | CE                                  |  | Remote   |
| Queensland Grouper                  | <i>Epinephelus lanceolatus</i> |              |                                     | Regulated by species <sup>1, 4</sup>                               | Remote   |
| Potato Cod                          | <i>Epinephelus tukula</i>      |              |                                     | Regulated by species <sup>1, 4</sup>                               | Remote   |
| Barramundi Cod                      | <i>Comileptes altilevis</i>    |              |                                     | Regulated by species <sup>1, 4</sup>                               | Remote   |
| <b>Turtles/ Reptiles</b>            |                                |              |                                     |  |  |
| Green                               | <i>Chelonia mydas</i>          | EN           | VU, LMS, LOMS                       | VU <sup>3</sup>  | Possible                                       |
| Loggerhead                          | <i>Caretta caretta</i>         | EN           | EN, LMS, LOMS                       | EN <sup>3</sup>  | Possible                                       |
| Flatback                            | <i>Natator depressus</i>       | DD           | VU, LMS, LOMS                       | VU <sup>3</sup>  | Possible                                       |
| Hawksbill                           | <i>Eretmochelys imbricata</i>  | CR           | VU, LMS, LOMS                       | VU <sup>3</sup>  | Remote   |
| Olive Ridley or Pacific Ridley      | <i>Lepidochelys olivacea</i>   | EN           | EN, LMS, LOMS                       | EN <sup>3</sup>  | Remote   |
| Leatherback                         | <i>Dermochelys coriacea</i>    | CR           | VU, LMS, LOMS                       | EN <sup>3</sup>  | Remote   |
| Estuarine (saltwater) crocodile     | <i>Crocodylus porosus</i>      |              | LMS, LOMS                           | VU <sup>3</sup>  | Remote   |
| Seasnakes                           | Family Hydrophiidae            |              | LMS                                 |  | Remote   |
| <b>Mammals</b>                      |                                |              |                                     |  |  |
| Dugong                              | <i>Dugong dugon</i>            | VU           | LMS, LOMS                           | VU <sup>3</sup>  | Remote   |

| Common name                   | Species                           | IUCN Listing | Commonwealth Legislation (EPBC Act) | Queensland Legislation (Nature Conservation Act and Fisheries Act) | Likelihood of species interaction with the DJF |
|-------------------------------|-----------------------------------|--------------|-------------------------------------|--|--|
| Indo-Pacific humpback dolphin | <i>Sousa chinensis</i>            | DD           | LOMS                                | Rare <sup>3</sup>  | Remote   |
| Irrawaddy dolphin             | <i>Orcaella brevirostris</i>      | DD           | LOMS                                | Rare <sup>3</sup>  | Remote   |
| Humpback whale                | <i>Megaptera novaeangliae</i>     | VU           | VU, LOMS                            | VU <sup>3</sup>  | Remote   |
| Southern Right whale          | <i>Eubalaena australis</i>        | LR-CD        | EN                                  |  | Remote   |
| Fin whale                     | <i>Balaenoptera physalus</i>      | EN           | VU                                  | Common <sup>3</sup>  | Remote   |
| Sei whale                     | <i>Balaenoptera borealis</i>      | EN           | VU                                  | Common <sup>3</sup>  | Remote   |
| Blue whale                    | <i>Balaenoptera musculus</i>      | EN           | LOMS                                | Common <sup>3</sup>  | Remote   |
| Bottlenose dolphin            | <i>Tursiops truncatus</i>         | DD           |                                     |  | Remote   |
| Bryde's whale                 | <i>Balaenoptera edeni</i>         | DD           |                                     |  | Remote   |
| Cuvier's beaked whale         | <i>Ziphius cavirostris</i>        | DD           |                                     |  | Remote   |
| Dense-beaked whale            | <i>Mesoplodon densirostris</i>    | DD           |                                     |  | Remote   |
| Fraser's dolphin              | <i>Lagenodelphis hosei</i>        | DD           |                                     |  | Remote   |
| Killer whale (orca)           | <i>Orcinus orca</i>               | LR-CD        |                                     |  | Remote   |
| Longman's beaked whale        | <i>Mesoplodon pacificus</i>       | DD           |                                     |  | Remote   |
| Minke whale                   | <i>Balaenoptera acutorostrata</i> | LR-NT        |                                     |  | Remote   |
| Pantropical spotted dolphin   | <i>Stenella attenuata</i>         | LR-CD        | LOMS                                |  | Remote   |
| Pygmy killer whale            | <i>Feresa attenuata</i>           | DD           |                                     |  | Remote   |
| Risso's dolphin               | <i>Grampus griseus</i>            | DD           |                                     |  | Remote   |
| Rough-toothed dolphin         | <i>Steno bredanensis</i>          | DD           |                                     |  | Remote   |
| Short-finned pilot whale      | <i>Globicephala macrorhynchus</i> | LR-CD        |                                     |  | Remote   |
| Sperm whale                   | <i>Physeter macrocephalus</i>     | VU           |                                     |  | Remote   |
| Spinner dolphin               | <i>Stenella longirostris</i>      | LR-CD        | LOMS                                |  | Remote   |
| Strap toothed beaked whale    | <i>Mesoplodon layardii</i>        | DD           |                                     |  | Remote   |
| Striped dolphin               | <i>Stenella coeruleoalba</i>      | LR-CD        |                                     |  | Remote   |

| Common name   | Species                            | IUCN Listing | Commonwealth Legislation (EPBC Act) | Queensland Legislation (Nature Conservation Act and Fisheries Act) | Likelihood of species interaction with the DJF |
|---|------------------------------------|--------------|-------------------------------------|--|--|
| <b>Marine Birds</b>                                 |                                    |              |                                     |  |  |
| <b>Family Diomedidae</b>                            |                                    |              |                                     |  |  |
| Wandering Albatross                                 | <i>Diomedea exulans</i>            | VU           | LMS, LOMS                           |  | Remote   |
| Yellow-nosed Albatross                              | <i>Thalassarche chlororhynchos</i> | LR-NT        | LMS                                 |  | Remote   |
| Black-browed Albatross                              | <i>Thalassarche melanophrys</i>    | VU           | LMS                                 |  | Remote   |
| <b>Family Procellariidae (Petrels, Shearwaters)</b> |                                    |              |                                     |  |  |
| Southern Giant Petrel                               | <i>Macronectes giganteus</i>       | VU           | EN, LMS, LOMS                       |  | Remote   |
| Northern Giant Petrel                               | <i>Macronectes halli</i>           | LR-NT        | VU, LMS, LOMS                       |  | Remote   |
| Gould's petrel                                      | <i>Pterodroma leucoptera</i>       | VU           | EN, LMS, LOMS                       |  | Remote   |
| Herald petrel                                       | <i>Pterodroma arminjoniana</i>     | VU           | CR, IMS                             | EN <sup>3</sup>  | Remote   |
| White necked petrel                                 | <i>Pterodroma cervicalis</i>       | VU           | LMS                                 |  | Remote   |
| Providence petrel                                   | <i>Pterodroma solandri</i>         | VU           | LMS                                 |  | Remote   |
| Huttons shearwater                                  | <i>Puffinus huttoni</i>            | EN           | LMS                                 |  | Remote   |
| Fluttering Shearwater                               | <i>Puffinus gavia</i>              |              | LMS                                 |  | Remote   |
| Tahiti Petrel                                       | <i>Psuedobulweria rostrata</i>     | LR-NT        | LMS                                 |  | Remote   |
| <b>Family Hydrobatidae (Storm Petrels)</b>          |                                    |              |                                     |  |  |
| <b>Family Phaethontidae (Tropicbirds)</b>           |                                    |              |                                     |  |  |
| Red-tailed tropicbird                               | <i>Phaethon rubricauda</i>         |              | LMS                                 | VU <sup>3</sup>  | Remote   |
| White-tailed Tropicbird                             | <i>Phaethon lepturus</i>           |              | LMS, LOMS                           |  | Remote   |
| <b>Family Sulidae (Gannets, boobies)</b>            |                                    |              |                                     |  |  |
| Brown Booby   | <i>Sula leucogaster</i>            |              | LMS, LOMS                           |  | Remote   |
| <b>Family Fregatidae (Frigatebird)</b>              |                                    |              |                                     |  |  |
| Greater Frigatebird                                 | <i>Fregata minor</i>               |              | LMS, LOMS                           |  | Remote   |
| Least Frigatebird                                   | <i>Fregata ariel</i>               |              | LMS, LOMS                           |  | Remote   |

| Common name                               | Species                          | IUCN Listing | Commonwealth Legislation (EPBC Act) | Queensland Legislation (Nature Conservation Act and Fisheries Act) | Likelihood of species interaction with the DJF |
|---|----------------------------------|--------------|-------------------------------------|--|--|
| <b>Family Laridae (Gulls and Terns)</b>   |                                  |              |                                     |  |  |
| Little Tern                               | <i>Sterna albifrons</i>          |              | LMS, LOMS                           | EN <sup>3</sup>  | Remote   |
| Caspian Tern                              | <i>Sterna caspia</i>             |              | LMS                                 |  | Remote   |
| Crested Tern                              | <i>Sterna bergii</i>             | CR           | LMS                                 |  | Remote   |
| Silver Gull                               | <i>Larus novaehollandiae</i>     |              | LMS                                 |  | Possible                                       |
| <b>Family Pelecanidae</b>                 |                                  |              |                                     |  |  |
| Australian Pelican                        | <i>Pelicanus conspicillatus</i>  |              | LMS                                 |  | Possible                                       |
| <b>Seahorses, Pipefish and Pipehorses</b> |                                  |              |                                     |  |  |
| Duncker's pipehorse                       | <i>Solegnathus dunckeri</i>      | VU           | LMS                                 | Regulated by number <sup>5</sup>                                   | Remote   |
| Pallid pipefish                           | <i>Solegnathus hardwickii</i>    | VU           | LMS                                 | Regulated by number <sup>5</sup>                                   | Remote   |
| Spiny pipehorse                           | <i>Solegnathus spinosissimus</i> | VU           | LMS                                 |  | Remote   |
| Robust pipehorse                          | <i>Solegnathus robustus</i>      | VU           | LMS                                 |  | Remote   |
| Gunther's pipehorse                       | <i>Solegnathus lettiensis</i>    | VU           | LMS                                 |  | Remote   |

Current at 2 June 2005

IUCN Listings:

- CR CRITICALLY ENDANGERED - A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A to E).
- EN ENDANGERED - A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria (A to E).
- VU VULNERABLE. - A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to E).
- LR LOWER RISK - A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories.
- DD DATA DEFICIENT - A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution is lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, or if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

EPBC Act and Queensland legislation

- CE Critically Endangered  
E Endangered  
V Vulnerable

R Rare  
LMS Listed Marine Species  
LOMS List of Migratory Species

<sup>1</sup> Coral Reef Fin Fish Management Plan

<sup>2</sup> Queensland *Fisheries Regulation 1995*

<sup>3</sup> Queensland *Nature Conservation (Wildlife) Regulation 1994*

<sup>4</sup> Under Section 65 of the *Fisheries Regulation 1995* the take, possession or sale of regulated fish is prohibited. Section 65 does not apply to shark fishing contractors.

<sup>5</sup> Queensland *Fisheries (East Coast Trawl) Management Plan 1999*

<sup>6</sup> Queensland *Fisheries (Freshwater) Management Plan 1999*

**Likely** Interactions are expected to occur regularly

**Occasional** Interactions may occur but not regularly

**Possible** Uncommon but has been known to occur

**Remote** An interaction may occur in exceptional circumstances.

## Management responses

### **2.2.4 There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species.**

No interactions with ETP species has occurred in the DJF to date as fishing activity has not commenced. The small scale of the developmental fishery, the manual harvesting method and selectivity of apparatus readily allow for capture avoidance of ETP species and it is considered highly unlikely for a capture to occur. It is also a provision of the fishery that any species taken unintentionally, including ETP species, are to be returned to the water with as little harm or injury as possible (permit condition 5). If an unexpected ETP species interaction were frequently reported, measures to mitigate interactions would be discussed by Harvest MAC and implemented.

### **2.2.5 There are measures in place to avoid impact on threatened ecological communities.**

As explain in 2.2.3, there are no known threatened ecological communities in the fishery locations hence management measures to avoid impacts are reasoned to be unnecessary.

If any disturbance to threatened ecological communities becomes apparent upon further research and assessment of fishing activity, appropriate management measures will be implemented by the DPI&F to avoid impacts on threatened ecological communities.

### **2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.**

The limited extent of fishery effort including temporal and spatial limitations, selectivity of gear, as well as the ability to modify the general permit conditions, suggests that management arrangement for the developmental phase of the jellyfish fishery are sufficiently precautionary relating to interactions with endangered, threatened and protected species.

Permit conditions also require the holder to provide an independent observer whose primary duty will be to report on any and all fishing activity deemed relevant by the DPI&F.

Following recommendations made by DEH, DPI&F has undertaken the task of developing and implementing an education program, for both recreational and commercial fishers, to promote the importance of protected species conservation and accurate incident reporting. The education program will apply across a range of fisheries and will include revision of the Endangered and Threatened Species Awareness Course that new and returning master fishers are obliged to undertake. The program will also target commercial fishers that aren't obliged to undertake the awareness course, through distribution of a protected species information guide. It is anticipated that the program will be implemented by the end of 2005 (Claire Andersen, DPI&F, *pers. comm.*, 2005).

## OBJECTIVE 3.

### THE FISHERY IS CONDUCTED, IN A MANNER THAT MINIMISES THE IMPACT OF FISHING OPERATIONS ON THE ECOSYSTEM GENERALLY.

#### Information requirements

**2.3.1 Information appropriate for the analysis in 2.3.2 is collated and/or collected covering the fisheries impact on the ecosystem and environment generally.**

And

#### Assessment

**2.3.2 Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of each of the following ecosystem components to the fishery.**

There is little information on interactions with prey species of *C. mosaicus* as their diet is poorly known. This species has, however, been reported to feed on small planktonic organisms or particles of food between 1mm and 3mm (Dakin, 1987; Georges, 1991). If the fishery progresses past the developmental stage, the DPI&F acknowledges the role of future research in determining predator/prey relationships in the DJF.

Studies have shown that jellyfish can act as fish attraction devices for juvenile finfish, particularly those in the family Carangidae, which may utilize aggregations of jellyfish as shelter. It has been suggested that reducing the number of medusae through commercial jellyfish fishing may influence the year class recruitment of particular finfish species (Hay *et al.* 1990). The limited area, low number of operators and selectivity of methods allows for a large percentage of the total jellyfish biomass found along the Queensland coast to be unaffected by fishing activity from the DJF and as such fin fish recruitment is not expected to be influenced.

Few species rely entirely on *C. mosaicus* as prey, although they are a known food source for some turtle species. As susceptible turtle species obtain food from other sources (Slater *et al.* 1998), and fishing effort of *C. mosaicus* is limited, the impact is expected to be minor.

It is believed that boating activity from the DJF would cause negligible disturbance to the environment due the low number of operators, compared with boating activity in these areas from other commercial and recreational fishing activity as well as tourism.

Limited information is available regarding the ecosystem inhabited by *C. mosaicus* and the DPI&F acknowledges that the effect the jellyfish fishery has on ecosystems in the fishery areas is a priority and further research has been proposed for this developmental period of the fishery. Impacts from the DJF are projected to be minimal.

Designated independent observers will primarily be responsible for collecting information regarding the DJF's impact on the ecosystem and general environment, although, it is likely that permit holders will also provide information when requested as relations between permit holders in this fishery and the DPI&F remain congenial due to the small nature of the fishery.

Further information regarding the effect the DJF may have on the ecosystem and environs will be collected during this initial developmental period. Proposed areas of research tendered by the DPI&F include:

- Determining biological and ecological aspects of *C. mosaicus*. In particular population dynamics such as the timing and duration of reproduction, population growth factors influencing jellyfish survival and fecundity;
- Assessing the impacts of environmental factors in the jellyfish fishery;
- Assessment of any impact on turtles

There should be minimal environmental impact from the processing of jellyfish as no processing, other than the separation of tentacles from the bell and salting, is permitted at sea. Fishers will separate tentacles as they are harvested, allowing dispersion of waste.

Land based processing facilities must comply with AQIS standards and it is conditional under the *Fisheries Act 1994* that the permit holder allows the facility to be inspected at any time.

## Management responses

### **2.3.3 Management actions are in place to ensure significant damage to ecosystems does not arise from the impacts described in 2.3.1.**

To ascertain the feasibility of a commercial jellyfish fishery in Queensland waters, The DPI&F has taken a conservative and precautionary ecological approach. This is validated by:

- A precautionary low TACC set prior to the determination of stock biomass for each fishing location
- Restricting the number of permits and operators entering the fishery
- Restricting fishing gear and vessels
- Limiting the developmental period to 3 years
- Requiring information from operators regarding target, bycatch and ETP species
- Requirement for an annual survey of the target stock and general environment

The small scale of the fishery coupled with the precautionary management strategies outlined ensures the DJF has a minimal impact on the ecosystem and any impacts that may occur are mitigated.

The fishery, being developmental, operates under reviewable permit arrangements and should future research and surveys suggest that the fishery is negatively affecting the ecosystem, enabling the DPI&F to address any ecological impact that may arise as the fishery progresses.

### **2.3.4 There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.**

Given the lack of quantitative information regarding environmental dynamics and ecology over most of *C. mosaicus* range, no decision rules or reference points have been determined. However, the DPI&F believe that the precautionary management approach that has been established for the Queensland DJF will deliver ecological sustainability in the absence of any fishery dependent information.

If actual or potential threats to the ecosystem are observed during the developmental phase, the DPI&F have the flexibility to implement appropriate and timely management responses for the fishery.

### **2.3.5 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.**

With the proposed effort and gear to be used in this fishery, the impacts to the environment and ecosystem from the DJF are considered to be minimal and the management responses suitably precautionary.

It is understood that annual surveys and observer programs will provide further information regarding the fishery's effect on specific ecosystems and lead to progressive management responses during the initial developmental phase of the DJF. Should the fishery surpass this developmental stage, management will be reviewed after further consultation with all resource users and stakeholders.

## DEFINITIONS

The following defines how certain terms will be interpreted in application of the guidelines.

**Associated and/or dependent species** - species associated with or dependent upon harvested species, for example species that are predator or prey of the harvested species.

**Biological diversity, biodiversity** - the variability among living organisms from all sources (including marine and other aquatic ecosystems and the ecological complexes of which they are part). Includes

- 1) diversity within species and between species; and
- 2) diversity of ecosystems.

**Bycatch** - species that are discarded from the catch or retained for scientific purposes, and that part of the "catch" that is not landed but is killed as a result of interaction with fishing gear. This includes discards of commercially valuable species.

**By-product** - species that are retained because they are commercially valuable but are not the main target species.

**Ecologically related species** - species that, while not associated with or dependent upon a harvested species, nevertheless are affected by the fishing operation.

**Ecologically sustainable** - use of natural resources within their capacity to sustain natural processes while maintaining the life-support systems of nature and ensuring that the benefit of the use to the present generation does not diminish the potential to meet the needs and aspirations of future generations.

**Ecologically viable stock** - ecological viable stock has a general rather than a specific meaning. It refers to the maintenance of the exploited population at high levels of abundance designed to maintain productivity, provide margins of safety for error and uncertainty and maintain yields over the long term in a way that conserves the stocks role and function in the ecosystem.

**Ecosystem** - the biotic (living) community and its abiotic (non-living) environment.

**Function** - relationships between components of the ecosystem, without which individuals could not survive and/or reproduce. E.g. protection for juveniles provided by marine plants; trophic relationships.

**Management regime** - In this document, refers to the policies, plans, action plans, strategic research plans, and all documentation that relates to the operations and management of the fishery.

**Overfishing** - can be defined in two ways which can act independently or concurrently: 1) "recruitment overfishing", where fishing activities are causing a reduction in recruitment in succeeding years and cause the mortality of too many fish in total, too many pre-productive fish, or too many fish that have only spawned a few times. The end result is that the stock can no longer replenish itself adequately. 2) "growth overfishing": where fishing activities lead to a reduction in the size of the individuals of a species, as a consequence of which few specimens grow to the size for optimum yield.

**Precautionary approach** - used to implement the precautionary principle. In the application of the precautionary principle, public and private decisions should be guided by: 1) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and 2) an assessment of the risk-weighted consequences of the various options.

**Precautionary principle** - the lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

**Precautionary recovery strategy** - Management and operational strategy, designed to increase numbers within the stock that incorporates the precautionary approach and includes mechanisms to avoid or mitigate adverse ecosystem effects.

**Productivity** - when applied to fish stocks the term productivity gives an indication of the birth, growth and death rates of a stock.

**Reference point** - an indicator level of fishing (or stock size) to be used as a benchmark for assessment or decision-making.

**Stock** - In the strict sense, a distinct, reproductively isolated population. In practice, a group of individuals of a species in a defined spatial range which is regarded as having a relatively low rate of exchange with others of the species.

## ACRONYMS AND ABBREVIATIONS

|              |   |
|--------------|---|
| AQIS         | Australian Quarantine Inspection Service  |
| ASIC         | Australian Seafood Industry Council   |
| CFISH        | Commercial Fisheries Information System   |
| CFT          | Centre for Food Technology  |
| CITES        | the Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| DEH          | Department of the Environment and Heritage  |
| DPI&F        | Queensland Department of Primary Industries and Fisheries                           |
| DJF          | Developmental Jellyfish Fishery   |
| EPA          | Environmental Protection Agency   |
| EPBC Act     | <i>Environmental Protection and Biodiversity Conservation Act 1999</i>              |
| ETP          | Endangered, threatened or protected   |
| ESD          | Ecologically Sustainable Development  |
| FRDC         | Fisheries Research and Development Corporation                                      |
| GBR          | Great Barrier Reef  |
| GBRMPA       | Great Barrier Reef Marine Park Authority  |
| GFP          | General Fisheries Permit  |
| IUCN         | the World Conservation Union  |
| LTMP         | LongTerm Monitoring Program   |
| MAC          | Management Advisory Committee   |
| NSW          | New South Wales   |
| QB&FP        | Queensland Boating and Fisheries Patrol (part of DPI&F)                             |
| QFS          | Queensland Fisheries Service (now DPI&F)  |
| QPWS         | Queensland Parks and Wildlife Service   |
| QSIA         | Queensland Seafood Industry Association (formally QCFO)                             |
| RAP          | Representative Areas Program  |
| SAG          | Scientific Advisory Group   |
| SOCI Logbook | Species of conservation interest logbook  |
| TACC         | Total Allowable Commercial Catch  |
| VMS          | Vessel Monitoring System  |
| WWF          | World Wide Fund for Nature  |
| ZAC          | Zonal Advisory Committee  |

**Appendix 1: General Fisheries Permit-Developmental.***Authorised Activities*

1. The holder is authorised to conduct developmental fishing for the following species only:
  - Jellyfish (*Catostylus mosaicus*)
2. The holder is authorised to take, possess and process and sell the permitted species.
3. The holder is authorised to take the permitted species only from the following waters:
  - Moreton Bay Marine Park waters – excluding the Caboolture River, waters west of the Hornibrook Highway (Pine River), the Logan River, waters south of the southern tip of Russell Island, and all Marine Park Protection Zones and Buffer Zones.
  - Tin Can Bay and Great Sandy Strait – with the northern limit being a straight line between Urangan, Hervey Bay and Moon Point, Fraser Island.
  - Waters in the Gulf of Carpentaria within Queensland jurisdiction – excluding waters west of 140°E (east longitude).

*Permit Conditions*

1. In accordance with section 66 of the Fisheries Act 1994, this General Fisheries Permit (GFP) is not transferable.
2. The holder is authorised to take the permitted species by hand held scoop/dip nets. Nets must be no more than 1 metre in diameter, with a mesh size no less than 30mm.
3. The holder or a person authorised to act under the GFP, must use no more than 2 boats (less than 7 metres in length) at any time to perform, or assist in the performance of the authorised activities.
4. If upon visual observation, juvenile animals (<15cm) are found to comprise a significant proportion (>25%) of the catch, consideration will be given to the suspension or closure of the fishery in the area of operation.
5. The holder shall ensure that all fish taken unintentionally during permitted activities are returned to the water as soon as practicable and with as little harm or injury as possible.
6. The Total Allowable Catch (TAC) is based on whole wet weight and is to be debited using bin volume-weight conversions, which are to be defined by an officer authorised by the Chief Executive during the first 6 to 10 fishing events. The holder is permitted to take only the following total allowable catch (TAC) from the area described in authorised activity 3:
  - 100 tonne jellyfish (*C. mosaicus*) for each permit holder in Moreton Bay and Tin Can Bay and
  - 200 tonne jellyfish (*C. mosaicus*) for each permit holder in Gulf of Carpentaria.
7. The holder must give to the Chief Executive the number of permitted species required by the Chief Executive for scientific or other purpose relevant to the management of the developmental fishery.
8. Any processing of the product (other than bell-tentacle separation and addition of salt) must be carried out on land at a place specified in prior written notice given to the Chief Executive. This notice must advise of both the street address and the postal address of the place.
9. The holder is prohibited from taking the permitted species during winter months (1 June to 31 August) when there is a known significant reduction in jellyfish numbers and sizes.
10. No more than 4 persons, acting under the direction of the holder, may take permitted species under the GFP at any one time.
11. The holder must ensure a boat being used to perform the authorised activities is clearly identified with the boat mark XXX or XXX at all times the boat is in use, whether or not there are persons on board the boat. The boats must have affixed to both sides of the hull the mark XXX or XXX. The mark must be dark upon light background or light on a dark background and be of at least the following dimensions: Height 200(mm) Width 20-25(mm)
12. The holder must keep a daily logbook in the form required by the Chief Executive by written notice. The holder must make the logbook available for immediate inspection by an inspector at all times, in accordance with section 173 of the Fisheries Act 1994.
13. It is the responsibility of the holder to provide and carry on board the boat XXX or XXX a person or persons independent to the fishery (the observer(s)) and authorised by the Chief Executive, to observe and report on the operations of the boat under this permit for a minimum of ten (10) days

per year. The observer shall observe and report on operations for such relevant purpose as the Chief Executive requires, including for scientific assessment or other purpose related to the management of the developmental fishery that the Chief Executive determines.

The holder must cooperate with any reasonable request made by an authorised observer to enable the observer to adequately perform the observer's functions.

The holder must allow the observer to enter the facility at which processing occurs to observe and report on the operations of the facility under this permit for such purpose as the Chief Executive requires.

14. The holder must allow an inspector under the Fisheries Act 1994 to enter the facility described in condition 8 at any time operations are occurring at that facility.
15. It is the responsibility of the holder to provide an independent person or persons authorised by the Chief Executive to conduct an annual survey of the stocks of jellyfish (*C. mosaicus*) in the associated area of the developmental fishery. The holder must obtain written approval from the Chief Executive on the methodology, survey aims and objectives before the survey is conducted. The holder must comply with any request from the Chief Executive for an observer to be present during the annual survey.  
The annual survey must be conducted between 1 November and 31 March each year, and during the same month each year. The Chief Executive must receive the results of the survey no later than 1 July each year.
16. The holder must advise the nearest Queensland Boating and Fisheries Patrol office at Pinkenba, Urangan, Karumba or Weipa, and the observer by telephone or facsimile within a reasonable period prior to commencing authorised activities on a day and persons involved in the take of jellyfish for that day. However, if the activities are to be done on a consecutive period of more than one day, the notice may be given once for the whole of the period, prior to the start of the period.

Queensland Boating and Fisheries Patrol Office at Pinkenba:

Phone: (07) 32251898

Fax: (07) 32242805

Queensland Boating and Fisheries Patrol Office at Urangan:

Phone: (07) 4125 3989

Fax: (07) 4128 9936

Queensland Boating and Fisheries Patrol Office at Karumba:

Phone: (07) 4745 9142

Fax: (07) 4745 9338

Queensland Boating and Fisheries Patrol Office at Weipa:

Phone: (07) 4069 8114 or 0404 857 974

Fax: (07) 4069 7404

DPI&F Observer – Martin Hicks

Phone: (07) 3247 5126

Fax: (07) 3224 2805

17. As required by section 88 of the Fisheries Act 1994, the holder, or if the holder is not present and any other person authorised to act under the GFP is doing anything authorised by it, then the person in control of the boat XXX or XXX, must have a copy of the GFP available for immediate inspection at all times.
18. The holder is responsible for the operation of all boats at all times that activities are carried out under this permit.
19. The holder may sell jellyfish taken in accordance with this permit. However, jellyfish sold in Queensland may only be sold to the holder of a Buyer Licence (Class A).

**Appendix 2: Logbook Format for the DJF**

DPI&F Queensland **LOGBOOK FOR DEVELOPMENTAL JELLYFISH FISHERY** JF01

|  |                     |  |                 |
|--|---------------------|--|-----------------|
| <b>Commercial Fisher's Name</b>  | <b>Boat Mark</b>    | <b>Logbook No.</b><br>1  | <b>Page No.</b> |
| <b>Commercial Fisher Licence No.</b>   | <b>Boat Name</b>    |  |                 |
| <b>General Fisheries Permit No.</b>  | <b>Landing Port</b> |  |                 |
| <b>Period(s) not fishing for jellyfish since last trip.</b><br><b>Specify boat activity code.</b><br>Activity Code<br>...../...../..... to ...../...../.....<br>.....<br>...../...../..... to ...../...../.....<br>..... |                     | <b>Boat Activity Codes</b><br>Steaming.....1<br>In port - not fishing.....2<br>Anchored - not fishing.....3<br>Activity recorded in another fisheries logbook....4 |                 |

Logbooks are to be submitted to the Logbook Section, DPI&F within 7 days of the end of each jellyfish fishing week.

| Date |       |      | Position               |                         | Effort                  |                |                          | Catch Details               |                         |                      |                             |                                    |                         |   |   |
|------|-------|------|------------------------|-------------------------|-------------------------|----------------|--------------------------|-----------------------------|-------------------------|----------------------|-----------------------------|------------------------------------|-------------------------|---|---|
| Day  | Month | Year | Latitude<br>Or<br>Grid | Longitude<br>Or<br>Site | No. Tenders<br>(Dories) | No. Collectors | Total Collector<br>Hours | Form<br>Whole<br>or<br>Bell | Bin<br>Size<br>(litres) | Number<br>of<br>Bins | Total<br>Volume<br>(litres) | Weight<br>Factor<br>W = _<br>B = _ | Whole<br>Weight<br>(kg) | Have you had any<br>interaction with species of<br>conservation interest<br>(SOCI)? |   |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | W                           |                         |                      |                             |                                    |                         | Y   | N |
|      |       |      |                        |                         |                         |                |                          | B                           |                         |                      |                             |                                    |                         | Y   | N |

**Comments:**

I certify that the information I have provided on this form is a true and accurate record of fishing activities and that interactions with species of conservation interest have been reported in the SOCI 01 logbook. **Commercial Fisher's Signature**

**REQUIREMENT TO KEEP AND GIVE  
LOGBOOK RETURNS**

**Background**

Under Section 118 of the *Fisheries Act 1994* (the Act), a regulation or management plan, a condition or an authority, or the chief executive by written notice, may require a person to –

- a) Keep, in the approved form, stated records, documents or other information about a fishery or fisheries resources; and
- b) Give the Chief Executive the records, documents or other information in writing, or in another stated way, or at stated times

Subsection (1) applies whether or not the person performs activities by way of fishing or other activities at the relevant time.

Under Section 109(1) of the *Fisheries Regulation 1995* (the Regulation), persons, including primary commercial fishing boat licence holders and holders of an authority to take, possess or sell fish, must keep and give statistical returns (records, documents or other information) to the Chief Executive as required by the Chief Executive.

**Delegation**

I advise that I hold delegation pursuant to Section 21 of the Act given to me by the Chief Executive to administer powers under the Act, including the Regulation and other subordinate legislation and/or policies.

**Requirement**

I, Peter Neville, Deputy Director General, Department of Primary Industries and Fisheries, Queensland, require that all holders of an Authority (including a General Fisheries Permit) issued by DPI&F Queensland allowing them to take the jellyfish *Catostylus mosaicus* under the prescribed conditions, immediately obtain a copy of the approved Queensland Developmental Jellyfish Fishery logbook (JF01) ("the Logbook") and upon receipt of it:

1. Ensure that the holder of the Authority or the person nominated by the Authority holder to take, possess or sell jellyfish completes the Logbook entries as per the Instructions for Use stated below; and
2. Ensure that the Logbook is kept in accordance with the instructions contained in the logbook and any written instructions the Chief Executive may, from time to time provide. The instructions in the logbook explain how to use the logbook; and
3. Gives the completed logbook to the Chief Executive in accordance with the instructions contained in the Logbook. In particular, this instruction requires that the completed logbook returns be forwarded to the Chief Executive within a specified time period after the fishing to which they relate has occurred.

Please note:

- a. that under Section 118 of the Act, failure to comply with the obligation to keep and give the Logbook, or other information about a fishery or fisheries resources required by the Chief Executive, may be liable to prosecution for an offence under this section of the Act, attracting a maximum penalty of 500 penalty units. Accordingly, it is advised that you contact the Department of Primary Industries and Fisheries directly to obtain a logbook before commencing fishing activities.
- b. that pursuant to Section 173 of the Act, Inspectors have the power to require you to produce for inspection a document required to be kept under the Act, including, and not limited to, logbooks.



**Peter Neville  
Deputy Director-General /  
Delegate for the Chief Executive  
Department of Primary Industries and Fisheries**

## **INSTRUCTIONS FOR USE**

*This logbook is to be used while participating in the Queensland Developmental Jellyfish Fishery. If participating in another fishery at any time, you must use the logbook specific to that fishery. Fishers with the appropriate General Fisheries Permit are authorised to take the large-bodied edible jellyfish, *Catostylus mosaicus*, harvested with hand held dip or scoop nets in accordance with permit conditions.*

**All days of the year must be accounted for in a fishery logbook.**

**At the start of each new jellyfish fishing trip, indicate the dates and activity (use boat activity codes 1, 2, 3 or 4) since your previous jellyfish fishing trip in the spaces provided. For example, if you were involved in a different fishery, enter Boat Activity Code # 4 with the appropriate dates – indicating your fishing activity for this period is recorded in another logbook.**

**Catch and effort data is to be entered into the logbook every fishing day.**

*This logbook is designed to collect information for management, research and compliance purposes. The information may be shared if there is an agreement with the Commonwealth, another State or entity prescribed by regulation for the management, use, development or protection of fisheries resources. Recording of the required information in this logbook every fishing day is required so that the information is as accurate and up to date as possible. It is important to note that should the information not be recorded every fishing day as required, appropriate enforcement action may be taken by a fisheries inspector, who has the power under the Fisheries Act 1994 to inspect the logbook.*

This logbook does not require carbon paper. The foldout writing template must be placed under the **pink** page when you are filling in the logsheet to prevent accidental marks on the next set of forms. The **white** pages need to be torn out, placed in the prepaid envelopes and mailed or faxed to DPI&F.

The **pink** duplicate page is designed to remain in the logbook for your use. There is space available on this sheet where you can write useful private information. This page should be kept as evidence of completion in case of loss of the original logsheet. Completed logsheets are to be sent to:

## **LOGBOOK SECTION**

**Department of Primary Industries and Fisheries**

**GPO Box 2764**

**BRISBANE QLD 4001**

**Or copies faxed to (07) 3227 8788**

Logsheets must be returned to DPI&F within 7 days of landing product, therefore allowing up to seven continuous days of fishing data to be accumulated before submission.

If no jellyfish fishing has occurred during a calendar month, then a NIL return must be returned within 14 days of the last day of the month. The non-fishing information must be filled out in the "*Period(s) not fishing for jellyfish since last trip*" section with a boat activity code entered. This page must be signed by the Authority holder.

## **FILLING IN THE LOG FORM**

Logbooks are to be completed by the licensed commercial fisher in control of the vessel during the period of fishing activity (i.e. the 'skipper'). This person needs to print their name at the top of the sheet and provide their Commercial Fisher Licence number.

Note: Under the *Fisheries Act 1994*, the authority holder has a general responsibility to ensure that everyone acting under the authority complies with the Act (section 219). For example, fishery logbooks are to be made available to the licensed commercial fisher in charge of the boat.

## **Effort**

Catch and effort data is to be reported daily.

- Enter the date and position (latitude/longitude) for each location where jellyfish are collected. Please indicate if position is in decimal minutes or decimal degrees. If GPS positioning is not available, indicate Grid and Site.
- If multiple locations are fished within the same day, enter position, effort and catch details for each different location.
- Indicate the number of tender vessels (eg. dories). If collecting jellyfish from the primary fishing vessel, enter a zero in this space.

- Indicate the number of people actively involved in harvesting jellyfish and the total number of collector hours per location. For example, 3 people collecting for 5 hours each equals 15 collector hours at that location.

### **Catch**

The "Catch" section is divided into three rows for each fishing date or location, to account for jellyfish collected as "whole", "bells" and "tentacles". Tentacles may be kept or discarded. If tentacles are retained, the corresponding bells must also be landed. In the "Catch" section of the sheet:

- Indicate the bin sizes (litres) used to hold jellyfish. You may need to use several rows per location if you use several different sizes of bins for each form of jellyfish.
- Enter the number of bins for each bin size containing whole jellyfish, bells only and tentacles only.
- Calculate the total volume (litres) of jellyfish, bells and tentacles by multiplying bin size (litres) by the number of bins.
- Calculate the total weight of harvested whole jellyfish by multiplying the total volume of bins containing jellyfish by the appropriate weight factor (whole = 1, bells only = 2, tentacles only = 0).
- Indicate whether you caught, or had an interaction with, any species of conservation interest that are listed in the SOCI 01 logbook (circle Y or N). Details of these interactions are to be recorded in the SOCI 01 logbook.

### **DECLARATION**

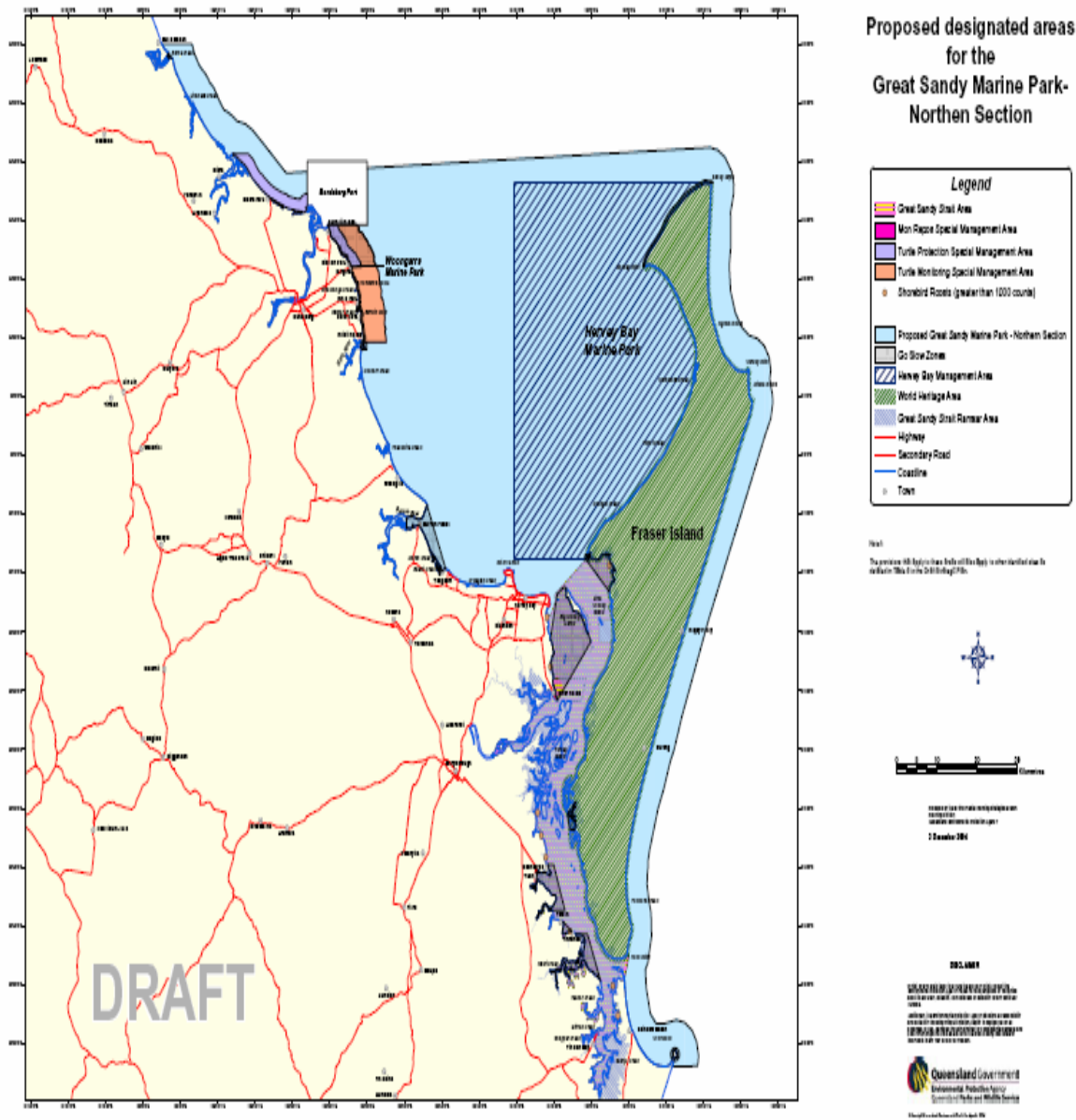
The person in charge of the fishing vessel engaged in jellyfish fishing and who entered the data must read the declaration at the bottom of each sheet and sign in the appropriate space to signify that all information recorded is a true and accurate description of fishing activities. Sign all sheets that have data recorded.

Should you have any enquiries about the Logbook Program or about using the logbook please phone us at (07) 3227 629

**Appendix 3: Draft map displaying the proposed designated areas for the GSMP- Northern Section**

*(Courtesy of EPA/ Queensland Parks and Wildlife)*

Map 4





## Summarised Instructions

### DIRECTION TO KEEP AND GIVE LOGBOOK RETURNS

#### Legislative requirements

All Queensland fisheries are managed under the *Fisheries Act 1994* (the Act) and the *Fisheries Regulation 1995* (the Regulation). Under other State and Commonwealth legislation, there is an obligation to report interactions with a range of species to the relevant Government Department. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) requires that a person whose action results in the death or injury of any animal listed as threatened, migratory, marine or a cetacean under the EPBC Act in a Commonwealth Area to report to the Secretary, Australian Government Department of Environment and Heritage.

The Queensland *Nature Conservation Act 1992* and subordinate legislation require that a person report the accidental taking of a whale, dolphin or dugong to a conservation officer, Environmental Protection Agency.

In addition to these obligations, the 'species of conservation interest' logbook has been designed to report any interactions with species of conservation interest (SOI). Reporting on this logbook does not fulfil obligations under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) or the *Queensland Nature Conservation Act 1992*. DPI Queensland Fisheries Service is collecting information regarding these interactions in order to report to Australian Government Department of Environment and Heritage and other organisations on the sustainability of fishing practices in Queensland. For this purpose, sustainability relates to the effect of fishing practices on all species, not just those targeted by the fishery.

#### Direction

1. Use the logbook if you are the licenced commercial fisher operating the boat, or make the logbook available to the licenced commercial fisher in charge of the boat;
2. Keep the logbook (or ensure that the logbook is kept) in accordance with the instructions contained in the logbook and any written instructions the Chief Executive may, from time to time provide; and
3. Give the completed logbook (or ensure that the completed logbook is given) to the Chief Executive in accordance with the instructions contained in the logbook. This instruction requires that the completed logbook returns be forwarded to the Chief Executive within a specified time period after the fishing to which they relate has occurred. I further direct all holders of an authority to take, possess or sell fish (commercial fisher licence holders) in charge of a boat to:

1. Ensure that a logbook specific to the fishing activity to be undertaken under the relevant primary commercial fishing boat licence is available to be completed before commencing fishing activities. If the owner of the boat is unable to make a logbook available, it is advised that you contact the Department directly to obtain a logbook before commencing fishing activities. Any logbook obtained from the Department must remain on the boat that it was issued to. Please note that under Section 118 of the Act, a person who fails to comply with an obligation to keep and give the logbook or other information about fisheries required by the Chief Executive is liable to prosecution for an offence against the Act (maximum penalty 500 penalty units).

#### FILLING IN THE LOG FORM

This logbook is to be used to report interactions you have with species of conservation interest during **any fishing operations** you undertake. It is not used to record any commercial catch, just interactions with species of conservation interest. Please record the **fishing gear** used and the **number and species** of all species of conservation interest you interacted with each day. The **release** condition must be recorded for each species.

#### POSITION REPORTING

Please provide the position where you interacted with the species of conservation interest. This is to be given either as: 1.30 minute GRID **and** 6 minute SITE (using the charts in the front of QFS logbooks) **or as** 2.latitude and longitude. (Please advise if your readout is in decimal minutes)

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