

# **Assessing the ecological sustainability of the Tasmanian octopus fishery**

**Application to the Department of Environment and Heritage  
Australia for approval of the Tasmanian octopus fishery under  
Schedule 4 of the *Environment Protection and Biodiversity  
Conservation Act 1999***



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DEPARTMENT *of*  
PRIMARY INDUSTRIES,  
WATER *and* ENVIRONMENT

Tasmania

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## EXECUTIVE SUMMARY

The taking of *Octopus pallidus* and *Octopus maorum* from Tasmanian State waters is assessed against the Commonwealth *Guidelines for the Ecologically Sustainable Management of Fisheries* as required under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999*.

*O. pallidus* and *O. maorum* are distributed around Tasmania and throughout southern Australian waters. The fishery in Tasmania for *O. pallidus* focuses on the Bass Strait; *O. maorum* is retained as a part of the bycatch in the Tasmanian southern rock lobster and scalefish fishery. *O. maorum* is also taken as a target fishery in Eaglehawk Bay in south east Tasmania by two commercial operators, where the fish are taken by hand with the aid of small vessels and one operator utilises a gillnet. See Attachment 4, for a map indicating the area of the target fishery for octopus.

The targeted fishery of *O. pallidus* in Bass Strait utilises unbaited octopus pots set on longlines that are left to soak for up to six weeks. Historically, the targeting of *O. pallidus* using octopus pots has taken place in the south east of the State at various times but in recent years the fishery has primarily focused on Bass Strait by a single operator.

The Tasmanian octopus fishery is managed through a combination of permits issued under the *Living Marine Resources Management Act 1995*, and through the *Fisheries Rules 1999*. Under these rules, any person must not take or possess more than 100kg of octopus in Tasmanian State waters unless authorised by a permit.

The low impact harvest methods employed through the use of unbaited pots, hand collection and the utilisation of octopus as bycatch of other fishing operations results in minimum impact of the octopus habitat and the wider ecosystem generally. The level of bycatch occurring in the fishery is minimal.

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The following sections of this assessment report are presented to address the Commonwealth *Guidelines for the Ecologically Sustainable Management of Fisheries* produced by the Department of the Environment and Heritage. The headings, principles and objectives are presented using the same numbering as the guidelines.

## A INTRODUCTION

### A.1 *History and description of the fishery*

There are two main species of octopus which are currently exploited by commercial fishers in Tasmanian State fishing waters. *Octopus pallidus* is primarily an inshore species and is found on soft sandy or muddy substrates at depths ranging from 7-275 metres. This species is prevalent off the north west coast of the State and forms the basis for the octopus pot fishery in Tasmania. Research into the specific biology of this species has been limited. Generally octopuses are capable of rapid growth and are short lived. The lifespan of *O. pallidus* is uncertain but probably 1-2 years. Female *O. pallidus* breed only once producing about 50-150 eggs. The female guards the eggs and then dies. A female octopus that is caught will not contribute to recruitment, and a female that broods her young to hatching will probably die in her lair and will not become available to the fishery again. It is therefore essential that a sufficient number of females survive the fishery to reproduce successfully and provide for recruitment to the stock.

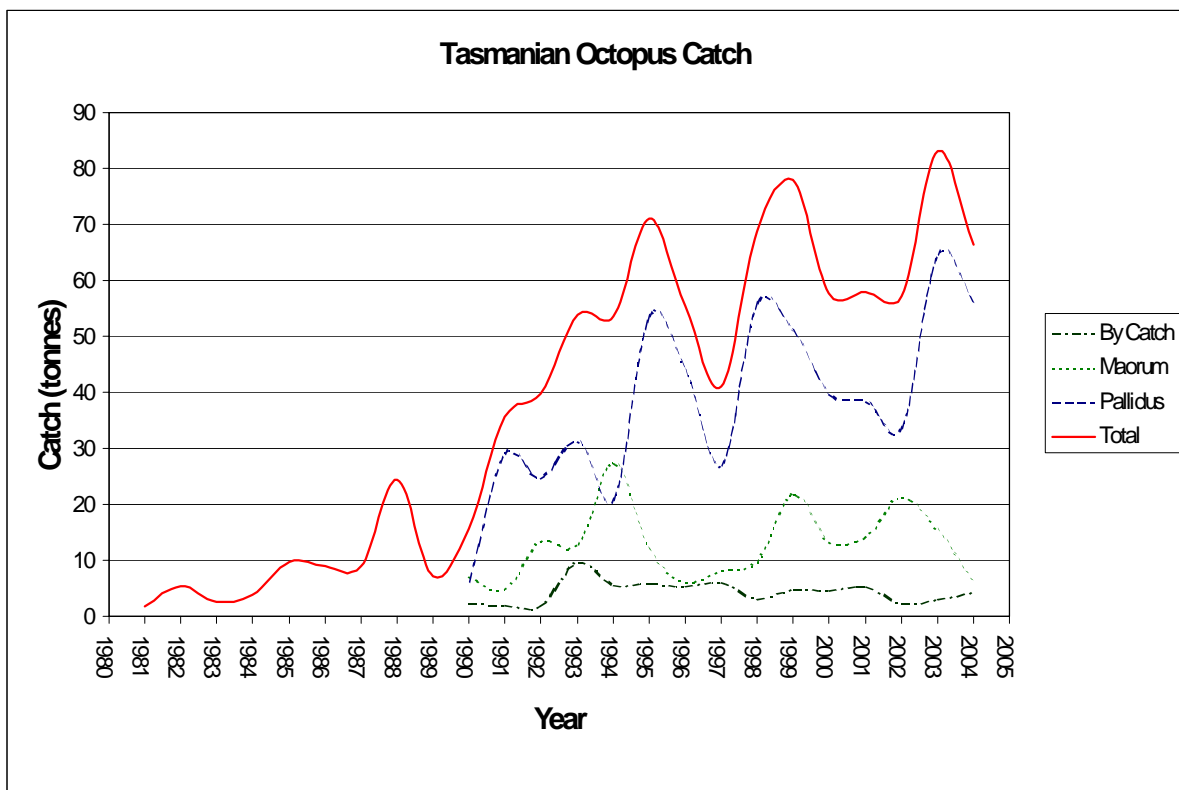
*Octopus maorum* is widely distributed in a diverse range of habitats, from inshore coastal reefs and sand flats to deeper regions as far as the continental shelf. This species is targeted by inshore fishing operations and recreational fishers in south east coastal waters. *O. maorum* is also taken as a bycatch in significant quantities by rock lobster and scalefish fishers State wide. *O. maorum* has a higher fecundity producing thousands of eggs. The adults can attain a size of 6-10 kg, and their lifespan is estimated to be 2-3 years. Females breed only once and then die as is common with most other octopus. Egg deposition and brooding probably takes place year round (Grubert et al. 2000) but may peak over a certain period or season as has been observed with most other medium to large sized octopus (Grubert et al. 2000).

Octopus have been taken in considerable numbers as bycatch of other fisheries, primarily from scalefish and rock lobsters fishing. Targeted fishing of octopus in Tasmania has existed since 1980. Participation in the fishery is currently controlled and access to the fishery requires a fishing licence (personal) and a fishing licence (vessel). In 1999 the Fisheries Rules restricted the amount of octopus to allow any person to take and possess no more than 100kg of octopus in State waters. This applies to commercial and recreational fishers. Since

1999 fishers wishing to take more than 100kg of octopus per fishing trip have been required to apply for a specific permit and demonstrate their historical involvement in the fishery.

Under the Offshore Constitutional Settlement Tasmania is responsible for the management of the octopus fishery out to 200 nautical miles. Under this agreement between the State and the Commonwealth, fishers will not be able to expand their access into areas that they did not have access to prior to the changes in jurisdiction, without prior consultation and agreement by both parties. This means that the only people who have access to octopus outside three nautical miles are those who held a Commonwealth permit for octopus, except where octopus is taken as bycatch of other fisheries, such as rock lobster giant crab and trawl fisheries.

*O. pallidus* forms the basis for the octopus longline fishery in Bass Strait. The main fishing method used to target these octopus is by setting unbaited pots attached to longlines along the bottom. "Flower pot" or "urn" type pots are hauled after about 3-6 weeks in the water to achieve optimum catch rates. The octopus are attracted to these pots as a refuge and for home-siting. An abundant food supply may support a large population of octopus in this area; a shortage of suitable shelters may account for the high catch rates in pots.



**FIGURE 1: Tasmanian Octopus landings since 1981**

Commercial quantities of *O. maorum* are gathered by hand from Eaglehawk Bay, a shallow sandy bay with large expanse of intertidal sand flats in the south east of Tasmania (see Attachment 4 for location). This is the only known inshore location within the species range where *O. maorum* aggregates year-round and can be caught in large numbers (Grubert et al. 1999). Gillnets are frequently used to impede the movement of migrating octopus, and these are subsequently removed from the base of the net by hand. Figure 1 shows the Tasmanian octopus catch since 1981.

Unbaited pots do not seem to be effective in catching commercial quantities of this species. However, significant amounts of *O. maorum* are taken as an incidental bycatch in baited rock lobster pots. The octopus are either, landed, kept for bait or discarded. Small quantities of octopus are also taken as part of a recreational fishery, particularly in the south east of the State, in Eaglehawk Bay.

The industry has developed a market niche based on the high quality of the product. Octopus is supplied to local, mainland and export markets, where unique valued added products have been developed such as smoked and pickled octopus.

## **A.2 Context of current management regime**

The *Living Marine Resources Management Act 1995* sets out the objectives for the sustainable management of living marine resources in Tasmania and provides the framework for developing and implementing management arrangements for each of the State's fisheries. The objectives of the legislation are provided in Section 7 and Schedule 1 of the Act and are consistent with the objectives of the resource management planning system of Tasmania.

- 7(1) *The purpose of this Act is to achieve sustainable development of living marine resources having regard to the need to -*
- (a) increase the community's understanding of the integrity of the ecosystem upon which fisheries depend; and*
  - (b) provide and maintain sustainability of living marine resources; and*
  - (ba) take account of a corresponding law; and*
  - (c) take account of the community's needs in respect of living marine resources; and*
  - (d) take account of the community's interests in living marine resources.*

- 7(2) *A person must perform any function or exercise any power under this Act in a manner which furthers the objective of resource management.*

## SCHEDULE 1 - OBJECTIVES OF THE RESOURCE MANAGEMENT AND PLANNING SYSTEM OF TASMANIA

1. *The objectives of the resource management and planning system of Tasmania are -*
  - (a) *to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and*
  - (b) *to provide for the fair, orderly and sustainable use and development of air, land and water; and*
  - (c) *to encourage public involvement in resource management and planning; and*
  - (d) *to facilitate economic development in accordance with the objectives set out in paragraphs a, b and (c); and*
  - (e) *to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.*
2. *In clause 1a, "sustainable development" means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while -*
  - (a) *sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and*
  - (b) *safeguarding the life-supporting capacity of air, water, soil and ecosystems; and*
  - (c) *avoiding, remedying or mitigating any adverse effects of activities on the environment.*

### **A.3 Description of current management regime**

The *Living Marine Resources Management Act 1995* provides the framework for the sustainable management of living marine resources in Tasmania.

Fishers are able to take and possess no more than 100kg of octopus in Tasmanian State waters. Participation in the fishery is currently controlled and requires participants to hold a

fishing licence (personal) and a fishing licence (vessel). Octopus can be taken with whichever gear a fisher is licensed to use.

There are three main fisheries where octopus is taken and retained. There is a permit fishery in Bass Strait utilising unbaited octopus pots targeting *O. pallidus*, the target fishery for *O. maorum* in Eaglehawk Bay and the bycatch fishery from rock lobster and scalefish fishing operations. Up to 100kg of octopus can be taken and retained as bycatch in State waters. The bycatch is recorded in the General Fishing Logbook.

The commercial target fishery for *O. pallidus* in Bass Strait is currently restricted to a single operator authorised under permit for the purposes of fisheries development (issued under section 14 of the Act). The permit authorises the fisher to take and possess more than 100kg of octopus in State waters and to be able to use and set up to 20,500 unbaited octopus pots (see Attachment 1 for an example of a permit). The permit holder is required to complete the Octopus Fishery Logbook (see Attachment 2 for an example) in addition to the General Fishing Logbook.

The target fishery for *O. maorum*, in Eaglehawk Bay takes place in a very small and restricted area at the head of the bay, there are two commercial operators taking commercial quantities of octopus. Under the last scalefish management plan review, the use of gillnets to take scalefish has been prohibited in the bay and adjacent areas. The take of *O. maorum* in Eaglehawk Bay is restricted to hand collection, from small vessels with the aid of lights and gaff hooks. One commercial operator has a permit (see Attachment 5 for an example of this permit) to continue to use a gillnet to take *O. maorum*. The gillnet used by this operator acts as a barrier to the movement of octopus, where they are collected by hand from the base of net, and is not used as an entangling or meshing devise. The use of gillnets to take octopus is in the process of being phased out by 2009, after which *O. maorum* will only be allowed to be taken by hand, with the aid of a small vessel, lights and gaff hook in Eaglehawk Bay.

Currently, targeted recreational fishing for octopus is concentrated in Eaglehawk Bay. Recreational fishers are restricted to a daily bag limit of five octopuses from Eaglehawk Bay, where fish are collected by hand with the aid of a gaff hook or landing net. Outside Eaglehawk Bay recreational fishers are able to take and possess 100kg of octopus, however, insignificant catches of octopus are taken outside this area.

### **A.3.1 Availability of documented management arrangements**

Permits are publicly available documents, as is generally the practice for releasing details of access and licensing arrangements for wild fisheries resources. Information and copies of the permits can be obtained from the fishery manager, the Marine Resources Division of the Department of Primary Industry, Water and Environment (DPIWE) on 6233 2044. The *Living Marine Resources Management Act 1995* and *Fisheries Rules 1999* can be viewed at [www.thelaw.tas.gov.au](http://www.thelaw.tas.gov.au).

Information about management arrangements for the taking of octopus for recreational fishers is provided in the Tasmanian Recreational Sea Fishing Guide.

### **A.3.2 Consultative process for developing management regime**

The Act describes the consultative process that must be undertaken if the Minister intends issuing a permit for fisheries development purposes. Prior to issuing a permit for taking of more than 100kg of octopus for this purpose, the Act requires that the Minister must consult with the relevant fishing body if he considers that granting the permit is likely to have a significant effect on that fishing body. The fishery manager in consultation with industry participants develops permit requirements for the fishery. In particular, any changes to permit conditions are discussed with the fishers prior to implementation. DPIWE consulted with commercial fishers and recreational fishing groups regarding the use of gillnets in Eaglehawk Bay as a part of a review of the Scalefish Management plan. This resulted in the phasing out the use of gillnets in the bay by 2009.

The Act also prescribes a consultative process for the development of a management plan. In practice the consultation process is more comprehensive than the minimum requirements described in the Act. The consultative process for the development or amendment of a management plan include:

- Consulting with the relevant Ministerial Fishery Advisory Committee, in this case the Scalefish Management Advisory Committee (SFAC), and the Recreational Fishery Advisory Committee (RFAC);

- Consulting with any appointed fishing body including Tasmanian Fishing Industry Council (TFIC) and the Tasmanian Association for Recreational Fishing (TarFish);
- The preparation and distribution of an options paper to licence holders and representative bodies supported by regional consultation meetings prior to the preparation of a draft management plan;
- Having the draft plan approved by the minister for release for public comment;
- Conducting a public comment period of at least 30 days for alteration to management plans and 60 days for a new management plan;
- Submitting a report to the minister on issues raised during the public comment period.

When more formal management arrangements are developed for the Tasmanian octopus fishery, there will be an opportunity for, commercial, recreational and general public to comment and have input into this process as is required under the Act.

### ***A.3.3 Expertise and community involvement in management of the fishery***

Management of the octopus resource in Tasmania is the responsibility of the Wild Fisheries Management Branch of DPIWE, in consultation with local community representatives where appropriate, commercial fishers, recreational interests in the octopus fishery, recreational fisheries managers, and any non-extractive users of State waters.

The Tasmanian Aquaculture and Fisheries Institute (TAFI) provides scientific advice and conducts research on various aspects of the Tasmanian octopus fishery, where the Wild Fisheries Management Branch consider the outcomes of research results and recommendations.

### ***A.3.4 Objectives of the management regime***

As the Tasmanian octopus fishery is still classified as a developing fishery, the Minister, where appropriate, takes account of the precautionary principle during the development of this

fishery. Restricting initial access in the early stages of development is particularly important until sufficient biological information is available. This approach is intended to avert any possibility that pressure to over-exploit the fishery could lead to overfishing or habitat degradation.

### **Policy objectives and management strategies for the Tasmanian octopus resource**

Below are the objectives of fisheries management for the Tasmanian octopus fishery and strategies to attain these objectives. The objectives are complementary to the stated resource management and planning objectives described in Schedule 1 of the *Living Marine Resources Management Act 1995*.

#### *1. Maintaining fish biomass and recruitment*

- Limiting number of participants in fishery by restricting permits issued.
- Limit total octopus catch.
- Restrict fishing methods and gear to be used in octopus harvest.
- Monitor performance of Tasmanian octopus fishery, primarily through catch, in sufficient detail to recommend alteration to management if necessary.

#### *2. Managing environmental interactions*

- Minimise any environmental impact of octopus fishing methods by specifying low impact fishing methods, particularly in areas of ecological significance.
- Minimise bycatch of non-target species by utilising selective fishing methods.
- Restricting targeting of octopus in Shark Refuge areas.
- Manage marine environmental concerns such as the introduction and translocation of disease in accordance with the relevant Departmental policies.

#### *3. Sustaining yield and reducing incidental fishing mortality*

- Limit access to fishers that can take greater than 100kg of octopus
- Sustaining yield by restricting the quantity of gear used (eg number of pots) and imposing trip possession limits for octopus in State Waters.

- To provide management measures including low impact fishing methods.

#### 4. *Access to octopus resources by non-commercial and non-extractive users*

- Maintain and provide reasonable access to Eaglehawk Bay for recreational users.
- Minimise adverse interaction between commercial octopus fishers and other users of the marine environment.

#### 5. *Enforcement and monitoring*

- To prevent persons taking octopus in excess of commercial or recreational catch limits under the *Living Marine Resources Management Act 1995*.
- To prevent any breach of octopus permit conditions by permit holders.
- To monitor the harvest of octopus and adjust management arrangements where necessary.

### **A.3.5 Controls on level of harvest in the fishery**

Controls on the level of harvest in the Tasmanian octopus fishery are implemented through input and output controls. Under the *Fisheries Rules 1999*, fishers are restricted to taking and possessing no more than 100kg of octopus in State waters. Currently one commercial operator is issued a permit for two vessels to take and possess more than 100kg of octopus, restricting the commercial operator to set no more than 20,500 unbaited octopus pots.

Fishers can apply for a permit to take more than 100kg of octopus in state waters if they can demonstrate past participation in the fishery, and when issuing any permit the level of past participation will be taken in to account.

### **A.3.6 Enforcement of management arrangements**

Tasmanian Police Marine and Rescue Division is responsible for compliance inspections, investigations and prosecutions in Tasmania. This includes that fishers must adhere to the maximum take and possession limit in State waters. If operating under permit fishers must carry a copy of the permit with them when fishing and comply with any gear restrictions authorised under permit.

Compliance checks are carried out by Tasmanian Marine Police Officers as required including during fishing, at landing points and processing facilities.

### **A.3.7 Provision for periodic review of the fishery**

Permits under the *Living Marine Resources Management Act 1995* for the development of fisheries can not be issued for a period longer than 12 months. Current permits have a duration of 12 months.

A minor review of the developmental fishery for *O. pallidus* is conducted upon the expiry of each permit and an evaluation is undertaken annually, (usually prior to the expiry of the permit at the end of November). This includes a review of research costs, access fees and gear allocation. The most recent review, undertaken after the expiry of the most recent 12 month permit in November 2004 and included revision of compliance with reporting and permit conditions, catch levels, gear allocation and research requirements.

The target fishery for *O. maorum* in Eaglehawk Bay was recently reviewed as a result of the scalefish management plan review in 2004, which follows a statutory process as outlined in section A.3.2. Public meetings were held where stakeholders could have their say on how the fishery should be run. The use of gillnets in Eaglehawk Bay was reviewed with gillnets being banned for the take of scalefish. Since then through further consultation with the commercial fisher, and recreational fishing groups provisions have been made for gillnets to be phased out for the taking of octopus and the fishery will go to hand collection by all operators by 2009. In the meantime, gillnets can not be used in Eaglehawk Bay on Saturday night, Easter Friday-Sunday and 24<sup>th</sup>-26<sup>th</sup> of December for the taking of octopus, periods identified as important to recreational fishers for the taking of octopus.

It is anticipated that in the near future the entire Tasmanian octopus fishery will be reviewed, as a part of the process of developing more formal management arrangements for the fishery. From there the legislative requirement of the Act will require that any octopus management plan developed be reviewed on a regular basis.

### **A.3.8 Research and assessment of any adverse impacts of the fishery on marine ecosystem**

TAFI provides independent research advice to the Department for the Tasmanian octopus fishery. The Department has supported and is contributing to a number of projects conducted by TAFI looking at *O. pallidus*, *O. maorum* and the impacts of fishing on the marine environment.

Completed projects include:

*Life history and ecology of Octopus maorum and minimisation of its impact on the rock lobster fishery in Tasmania.* This project also included *Predation of trap caught southern rock lobsters (Jasus edwardsii) in Tasmanian waters by the maori octopus (Octopus maorum): spatial and temporal trends* (Harrington et al. in press). This project looked at the movement and reproduction of *O. maorum* in Eaglehawk Bay and the predation of rock lobster in pots by *O. maorum*.

*Sexual maturity and fecundity of Octopus maorum in southeast Tasmania* (Grubert et al. 2000). This project looked at the *O. maorum* aggregation in Eaglehawk Bay and the links between the aggregation and the reproductive state of *O. maorum* over a period of eight months. No direct observation of spawning was found in the field despite most octopus sampled being close to maturity and females ready to lay eggs were caught in all months except May and August.

*Diet and feeding strategy of octopus maorum in southeast Tasmania* (Grubert et al. 1999). This project looked at the diet and feeding of *O. maorum* in Eaglehawk Bay. The project found that many of the octopus sampled had empty stomachs, this could have been due to the late stage of maturity of many of the octopus sampled. Prey items consisted of 12 species, a relatively narrow range for octopus.

A number of projects are currently being conducted on *O. maorum* and *O. pallidus*, these include:

*Life history and dispersal of the pale octopus, Octopus pallidus. Are pale octopus vulnerable to localised depletion?* The aim of this project is to investigate the biology, ecology and population dynamics of *O. pallidus* and determine their susceptibility to localised depletion.

This study will be used to assist in the ecologically sustainable development of the fishery by focussing on factors such as age, growth, reproduction, distribution and dietary analysis, combining this information with fishery data. Techniques have recently been developed at TAFI that allow octopus to be aged and this project will be the first in the world to assess age, growth and age at maturation of an octopus species in the wild.

*Stock structure and dispersal of two commercial octopus species (Octopus maorum and Octopus pallidus), with emphasis on early life history: a multi-disciplinary approach.* This project will examine and compare the stock structure and dispersal of two important octopus species (*O. pallidus*, *O. maorum*), and assess their differing vulnerabilities to fishing pressure. This will be achieved using novel, innovative methods including genetics and microchemistry. Emphasis is given to their early life history strategies, which are markedly different between the two species. The aims are being achieved using a multi-disciplinary approach, primarily microsatellites and statolith and stylet elemental signatures.

*Life history modelling and population dynamics of commercial Cephalopods (Octopus pallidus and Sepioteuthis australis).* Cephalopods exhibit extraordinary consumption rates, rapid individual growth and high rates of population turnover but there is a poor understanding of the regulating mechanisms involved. Using a combination of bioenergetic and population models this project examines the relative importance of temperature and food availability on individual growth and life history, and consequently on population dynamics of these predators.

All these projects will improve our knowledge of octopus stocks leading to a better understanding of the biology, ecology, impacts on the marine environment and the effects of removing octopus through fishing, leading to an improved ability to make decisions regarding the management of the fishery.

### ***A3.9 Compliance with abatement and recovery plans and bycatch action strategies***

There are no formal abatement plans, recovery plans or bycatch action strategies for the Tasmanian octopus fishery.

Due to the nature of the Bass Strait target *O. pallidus* fishery and the fishing method employed (unbaited octopus pots), the quantity of bycatch taken is negligible.

DPIWE has recently assessed the impact of gillnetting in the Eaglehawk Bay *O. maorum* fishery. Determining that due to fishing practices exhibited (constant attendance of net) by the fisher, impacts on bycatch is minimal, with any bycatch caught being able to be released unharmed. This operator is required to keep a logbook (which is returned to DPIWE) of all bycatch caught and its condition (released alive, damaged or dead) see Attachment 3 for an example of the bycatch data collection form. Other fishers operating in the bay are only allowed to collect octopus by hand, resulting in no bycatch. By 2009, participants in the Eaglehawk Bay fishery will only be allowed to collect octopus by hand.

The fishery independent observer program was initiated to monitor the commercial fishing operation and scalefish bycatch, whilst utilising gillnets when targeting octopus. Through this observer program, scalefish bycatch was recorded along with the condition of any bycatch when released. This is an ongoing program to continually assess the nature of scale fish bycatch in Eaglehawk Bay whilst targeting octopus using gillnets.

## **B ASSESSMENT OF THE TASMNAINA OCTOPUS FISHERY AGAINST “GUIDELINES FOR THE ECOLOGICAL SUSTAINABLE MANAGEMENT OF FISHERIES”- Assessment of the management regime against principle 1 and principle 2**

### **B.1 PRINCIPLE 1.**

**A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover.**

#### ***B.1.1 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.**

#### ***B.1.1.1 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.***

A reliable fishery catch return logbook system has been in place since 1981. Currently fishery dependent catch and effort data is collected through the General Fishing Logbook, which must be returned to the Department at the end of each month. Those fishers operating under permit to take and possess more than 100kg of octopus a day are required to complete the Octopus Fishery Logbook as well as the General Fishing Logbook.

In the *O. pallidus* fishery, fishery independent research and monitoring is being undertaken through the completion of the project titled *Life History and Dispersal of O. pallidus*, conducted by the Tasmanian Aquaculture and Fisheries Institute (TAFI). The project is

looking at determining if *O. pallidus* are vulnerable to localised depletion as a result of fishing pressure, due to the life history and potentially limited dispersal of this species. A second project titled *Stock structure and dispersal of two commercial octopus species: a comparison between benthic and planktonic early life histories*, will provide an analysis of the stock structure and dispersal of *O. maorum* and *O. pallidus*. Providing essential information on their biology and ecology and directly facilitating the development of effective management plans and sustainable fishing practices. Recently research was completed looking at aging of *O. pallidus* using stilet structures (Doubleday et al. 2005); this will provide valuable information for input into fisheries stock assessment models.

Fishery independent *O. maorum* catch and effort data has been collected by TAFI since 1993 as a part of the long term fishery independent rock lobster catch sampling program. *O. maorum* bycatch was recorded and analysed looking at seasonal changes in *O. maorum* catch as a bycatch of rock lobster fishing in the report titled *Predation of trap caught southern rock lobsters (Jasus edwardsii) in Tasmanian waters by the maori octopus (Octopus maorum): spatial and temporal trends*, (Harrington et al. in press).

In the *O. maorum* Eaglehawk Bay fishery, fishery dependent and fishery independent monitoring has taken place. Fishers are required to complete the General Fishing Logbook, recording catch and effort and the permit holder authorised to use gillnets must record any bycatch and its condition on release. TAFI has undertaken fisheries independent monitoring, completing a project titled *Life history and ecology of Octopus maorum and minimisation of its impact on the rock lobster fishery in Tasmania*, undertaking a scientific review (Semmens unpublished) of the fishery looking at movement and reproduction of *O. maorum* within Eaglehawk Bay. The University of Tasmania has undertaken two studies looking at *O. maorum* titled *Sexual maturity and fecundity of Octopus maorum in south east Tasmania* (Grubert et al. 2000) and *Diet and feeding strategy of Octopus maorum in south east Tasmania* (Grubert et al. 1999). Officers of the Department of Primary Industries Water and Environment (DPIWE) have been regularly attending commercial fishing operations in Eaglehawk Bay as a part of an independent ongoing monitoring program, collecting fishery independent bycatch data from gillnetting operations.

#### **B.1.1.2-5      *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.*

A number of projects are currently being conducted by TAFI looking at the Tasmanian octopus fishery these are *Life history and dispersal of Octopus pallidus: are they vulnerable to localised depletion?* Two projects have recently started titled *Stock structure and dispersal of two commercial octopus species: a comparison between benthic and planktonic early life histories* and *Life history modelling and population dynamics of commercial cephalopods*. These projects will focus on the *O. pallidus* trap fishery in Bass Strait and the target fishery for *O. maorum* in Eaglehawk Bay. These will provide a robust assessment of the dynamics fishery looking at stock structure and reproductive capacity of the fishery.

A comprehensive stock assessment across the distribution of all known octopus stocks in Tasmania is not justified because of the small size of the fishery and the concentration of fishing effort in two main areas (see Attachment 4, for location of the main fishing areas).

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

The known distribution of *O. maorum* and *O. pallidus* in Australia is from the Great Australian Bight around Tasmania to southern New South Wales. *O. maorum* is found to Lakes Entrance Victoria (Edgar 2000). *O. pallidus* tends to be associated with soft silt and sandy benthic habitats whilst *O. maorum* is found across a variety of habitats out to the continental shelf.

The fishery for *O. pallidus* is concentrated on the Bass Strait and the target fishery for *O. maorum* is primarily concentrated at the head of Eaglehawk Bay. *O. maorum* is also taken throughout Tasmania in low numbers as bycatch in the Tasmanian rock lobster, and scalfish fishery. Management of the Tasmanian octopus fishery is primarily focused on the target fisheries in Bass Strait and Eaglehawk Bay (see Attachment 4, for location of the main fishing areas).

*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.*

Since 1981 octopus has been required to be recorded in commercial catch returns (see figure 1 for a history of Tasmanian octopus landings). Any commercial fisher taking octopus, whether targeted or as bycatch is required to complete the General Fishing Logbook, recording quantities taken and quantity of effort used. The fisher authorised by permit to take and possess more than 100kg of octopus a day must complete the Octopus Fishery Logbook, recording catch, effort and location of catch.

The 2000/2001 national recreational survey identified that fewer than 1000 octopuses were taken by recreational fishers in those years (Lyle 2005). The recreational take of octopus State wide is thought to be insignificant, except for Eaglehawk Bay, where recreational fishers are reported to take significant quantities of *O. maorum*. A recreational possession limit of five octopus per day applies to Eaglehawk Bay and a possession limit of 100kg applies to the remainder of State waters. This daily limit also applies to Aboriginal fishers. The Tasmanian Aquaculture and Fisheries Institute is currently planning a project looking at the catch of *O. maorum* in Eaglehawk Bay by recreational fishers.

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

At this stage there is no estimate of the potential productivity of the fished stock and the proportion that could be harvested. The *O. pallidus* catch is controlled through input controls, limiting the number of participants in the fishery and restricting the number of unbaited pots able to be set. TAFI has several projects currently under way looking at potential productivity of the fishery.

The proportion that could be harvested in the Eaglehawk Bay target fishery for *O. maorum* depends on the level of reproduction of octopus in the bay. Current research has shown that the majority of *O. maorum* that move into the bay are fully mature or in the late stages of maturity (Semmens unpublished, Grubert et al. 2000). Despite the predominance of mature animals in the bay, there is no evidence of egg batches being laid in the bay, suggesting that

females are captured before they can lay or that this silty bay is not suitable habitat for egg laying (Semmens unpublished). It is not understood why large numbers of octopus move into the bay, it is possible that the octopus are 'funnelled' into the bay by environmental factors and do not actively choose to enter the bay (Semmens unpublished). They may become trapped in the bay and never spawn, despite having the potential to do so, as the habitat offered by Eaglehawk Bay is not conducive to spawning, which lacks hard substrate (Semmens unpublished). If this were the case, then the fishery would have no impact on the population as a whole, as the animals would be lost to the system regardless of whether they were fished or not (Semmens unpublished). Further research is required to determine why octopus enter the bay and to determine if octopus entering Eaglehawk bay are being prohibited from mating or spawning by the fishery as this will influence the proportion that could be harvested.

#### ***B.1.1.6-9 Management responses***

*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.*

As can be seen from figure 1, Tasmanian octopus landings, catches are highly variable, this is expected given their short life-spans and highly variable life-history characteristics, with this variability closely linked to environmental factors - namely temperature and food availability (Semmens pers. com.). Previous studies have shown that octopus catch rate can change over spatial (Mather 1993; Brock et al.. 2004), inter-annual (Ambrose 1998; Brock et al.. 2003), seasonal (Anderson 1999; Sanchez et al.. 1993, Brock et al.. 2004) and lunar (Grubert, unpublished data) scales.

No formal trigger points for the Tasmanian octopus fishery have been developed, due to its status as a developing fishery. The main response to reaching upper levels for catch and effort in the fishery is to vary, or if necessary, not issue further permits. Other indicators in the fishery that may prompt management actions include significant changes in density, indications of poor recruitment or high rates of natural mortality. Such changes may be indicated via information received from fishers.

The management response to indications of change in the fishery could be to authorise one or more of the following actions:

- Re-evaluate gear allocations.
- Introduce area or seasonal closure.
- Other appropriate management measures.

These actions could be implemented quickly by varying permit conditions as provided for under the Act.

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

In the *O. pallidus* pot fishery the primary management strategies in place for controlling the level of catch are input controls including a limit on the number of fishers participating in the fishery and to limit the number of octopus pots allowed to be used to 20,500. In the *O. maorum* fishery, fishers are restricted to taking and possessing no more than 100kg of octopus in State waters and using no more than 400m of gillnet (one fisher authorised by permit, see Attachment 5 for an example of this permit) in Eaglehawk Bay. Recreational fishers are able to possess five octopus from the waters of Eaglehawk Bay and possess no more than 100kg of octopus from the remainder of State waters.

*1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species.*

Due to the low impact fishing methods employed, utilising unbaited pots, hand collection and attended gillnetting; fishing is conducted in a manner that does not threaten stocks of bycatch species. No bycatch is reported in the *O. pallidus* fishery, with the use of unbaited pots. In the *O. maorum* target fishery, fish are collected by hand resulting in no bycatch. One fisher is issued a permit to use a gillnet, due to the fishers close attendance of the gear any non-target species caught can be quickly released in good condition, the permit requires that no bycatch is to be retained. DPIWE has worked closely with the gillnet fisher to ascertain the quantity and condition of bycatch species and have determined that fishing is conducted in a manner that does not threaten stocks of bycatch species.

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

Due to the small-scale nature of the fishery, restriction on participants and low impact fishing methods management responses has a high chance of achieving the objectives.

### **B.1.2 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.**

#### **B.1.2.1-2 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.*

This currently is not applicable, as reference points have not been established because the fishery is in a developmental stage.

To comply with the objectives of the *Living Marine Resources Management Act 1995*; the Minister must take appropriate action to ensure a fishery is managed sustainable. The Act provides powers to review or revoke management plans or to take emergency action to rectify threatening actions.

*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.*

Currently not applicable.

## **B.2 PRINCIPLE 2.**

**Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.**

### ***B.2.1 Objective 1.***

**The fishery is conducted in a manner that does not threaten bycatch species.**

#### ***B.2.1.1 Information requirements***

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

Due to the low impact nature of the fishery, bycatch is considered negligible for the Tasmanian octopus fishery. In the Eaglehawk Bay *O. maorum* target fishery, the level of bycatch taken through the use of gillnets has been assessed DPIWE officers, due to the fisher closely attending the net during fishing operations any bycatch caught is released in good condition. The use of gillnets in the fishery is in the process of being phased out and the fishery is due to revert solely to hand collection by 2009, eliminating all bycatch.

#### ***B.2.1.2 Assessments***

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

No specific risk analysis on bycatch species has been conducted as the take of bycatch has been found to be negligible.

#### ***B.2.1.3-6 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 only part of the Tasmanian octopus fishery where bycatch has been identified as significant is the target fishery for *O. maorum* in Eaglehawk Bay, where one operator has a permit to use a gillnet to take octopus. DPIWE with the cooperation of the fisher has undertaken an assessment on the level and nature of bycatch species, and have determined that due to the nature of the operation (close attendance of fishing gear in shallow water) any bycatch taken can be released unharmed. The permit issued requires that all bycatch be released. The take of octopus bycatch by rock lobster fishers has been assessed in the Tasmanian Rock Lobster Fishery ESD assessment which is due to be reassessed in 2006 and will be covered in that report.

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

Not currently applicable. None of the bycatch species are taken in sufficient numbers to warrant monitoring in this manner.

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

Not applicable at this stage.

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

Not applicable at this stage. DPIWE continues to monitor the level of bycatch taken by gillnet in the target fishery for *O. maorum* in Eaglehawk Bay. However, the Act provides for amendments to management plan and emergency responses that could be used to protect a species that was perceived to be under threat.

**B.2.2 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.**

There is no interaction between the fishery and any known endangered, threatened or protected species at this stage.

### **B.2.3 Objective 3.**

**The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.**

#### **B.2.3.1 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.*

Due to the small scale and low impact fishing methods the impact on the ecosystem and the environment is thought to be negligible. The target fishery for *O. pallidus* takes place over silt and sandy bottom in 20-50 meters, out of any known seagrass beds, other sensitive or unique habitat types. TAFI is planning habitat mapping in the area of the *O. pallidus* fishery in the future. No information is available covering the fisheries impact on the ecosystem and environment generally, but is believed to be minimal.

The target fishery for *O. maorum* in Eaglehawk Bay is very localised and takes place on sand in the intertidal zone at the head of the bay. TAFI habitat mapping of the area has identified no sensitive or unique habitat types where the vast majority of the fishing takes place; sea grass beds have been identified out in the middle of the bay, away from the main area of the target fishery.

#### **B.2.3 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.*

##### *1. Impacts on ecological communities*

- *Benthic communities*

- *Ecologically related, associated or dependent species*
- *Water column communities*

## 2. *Impacts on food chains*

- *Structure*
- *Productivity/flows*

## 3. *Impacts on the physical environment*

- *Physical habitat*
- *Water quality*

Due to the small scale of the fishery and low impact fishing methods impacts on ecological communities is regarded as low. Impact on benthic communities can be regarded as low due to the low impact fishing methods of utilising unbaited octopus pots and hand collection; fishing is often localised, restricting any potential impacts to small areas. The targeting of octopus with unbaited pots is not permitted in Shark Refuge areas (as defined by *Fisheries Rules (Scalefish) 2005*). Colin et al. (2001) found that octopus species were a significant prey item of gummy sharks in southern Western Australia. Gummy sharks are recorded as preying on *O. pallidus* throughout Bass Strait, where Walker (1989) found that cephalopods contributed significantly to their diet and the most significant predator-prey interaction is between gummy shark and *Octopus spp.* Walker (1989) also stated that extensive development of the octopus fishery is likely to affect the availability of octopus to gummy shark. Hume et al. (2004) identified *O. maorum* and *O. pallidus* as significant prey items of Australian fur seals in Bass Strait. Once again due to the small scale of the fishery and localisation of fishing effort any impact is thought to be minimal.

Targeted fishing of octopus using unbaited pots, hand collection and gillnets is likely to have a negligible impacts on the physical environment, due to the small scale, localisation of fishing and passive fishing techniques. Due to the small scale of the fishery no risk analysis has been completed.

### **B.2.3.3-5      *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.*

Not applicable at this stage. However, the Act provides for amendments to management plan and emergency responses that could be used to protect habitats and ecosystems should commercial octopus fishing be deemed to be having significant impact.

*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.*

The Act provides for amendments to management plans and emergency responses that could be used to protect habitats and ecosystems should commercial octopus fishing be deemed to be having significant impact.

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

Due to the small scale of the fishery any management response has a high chance of achieving the objective.

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## **D GLOSSARY OF ABBREVIATIONS**

TAFI – Tasmanian Aquaculture and Fisheries Institute

TFIC – Tasmanian Fishing Industry Council

DPIWE – Department of Primary Industries, Water and Environment

'The Act' – The *Living Marine Resources Management Act 1995*

'The Minister' – The Minister for Primary Industries, Water and Environment

## **E ATTACHMENTS**

1. Example of permit issued under Section 14 of *Living Marine Resources Management Act 1995* to use pots to take octopus.
2. Example of octopus fishery log book.
3. Example of octopus fishery bycatch data collection form.
4. Location of main fishing grounds Tasmanian octopus fishery.
5. Example of permit issued under Section 14 of *Living Marine Resources Management Act 1995* to use a gillnet to take octopus.

# Attachment 1: Permit Example, Using Octopus Pots



DEPARTMENT *of*  
PRIMARY INDUSTRIES,  
WATER *and* ENVIRONMENT

Tasmania

**LIVING MARINE RESOURCES MANAGEMENT ACT 1995**  
**PERMIT ISSUED UNDER SECTION 14**  
**Taking Octopus Using Unbaited Traps**

**PERMIT NUMBER:** <Permit No.>  
**PERMIT HOLDER:** Mr <First Name> <Last Name>  
<Address>  
<Address>  
**DATE OF ISSUE:** <Day-Month-Year>  
**DATE OF EXPIRY:** <Day-Month-Year>

**ACTIVITIES AUTHORISED BY THIS PERMIT:**

This permit is issued for the purpose of fisheries development. It authorises the permit holder or the nominated supervisors of fishing vessels <Vessel Name> (<Distinguishing Mark>) to use octopus traps take and possess more than 100 kilograms of octopus (*Octopus pallidus*, *Octopus maorum*) each day from State waters in accordance with the terms and conditions set out below.

**CONDITIONS**

**It is a condition of this permit that the permit holder, or the nominated Supervisors, of the fishing vessel stated above –**

1. must not use to take fish, carry or have possession of more than a maximum of 20500 octopus traps in State waters under the authority of this permit.
2. must not use, carry or have possession of octopus traps that exceed 5 litres in volume.
3. must not use or permit to be used any bait in octopus traps used under the authority of this permit.

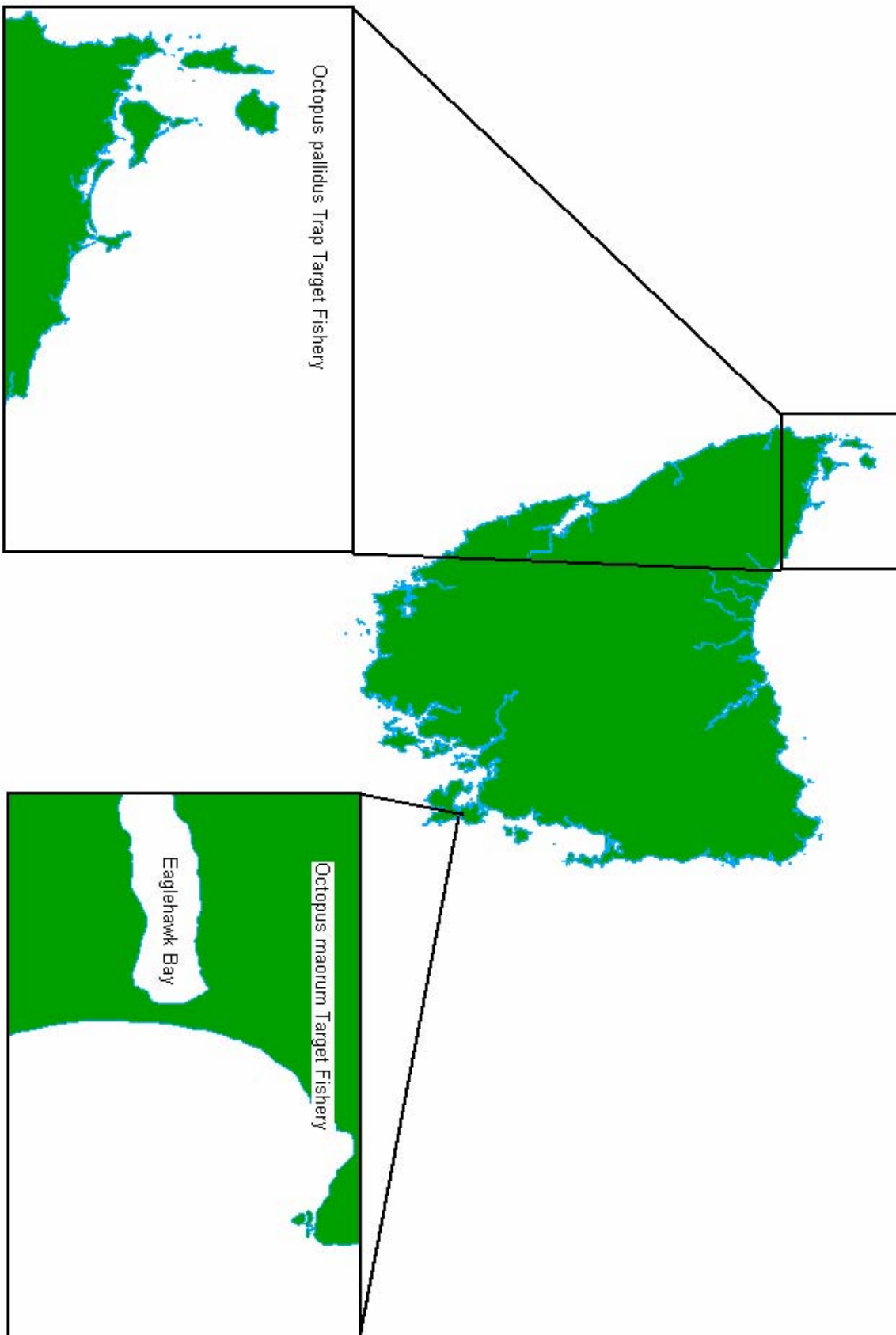
4. must not set or use any traps within the following areas of State waters:
  - a) Shark Refuge Areas, as defined by the *Fisheries Rules (Scalefish) 2004*; and
  - b) No Netting Areas defined in rule 86 of the *Fisheries Rules (Scalefish) 2004*; and
  - c) Restricted Netting Areas in rules 87, 88 and 89 of the *Fisheries Rules (Scalefish) 2004*.
5. must not conduct any activities under this permit within marine nature reserves, marine resources protected areas, the area defined as Taroon waters and research areas.
6. must ensure that all lines of traps are marked at both ends with surface marker buoys.
7. must ensure that all main marker buoys used in activities under this permit are marked clearly and legibly with the vessel's distinguishing mark and the words "Occy Trap".
8. must, in addition to the main buoy, attach within one metre of the main buoy a marker, legibly and clearly marked with the permit number specified on this permit and a line number to identify each line individually.
9. must permit an officer from the Department of Primary Industries, Water and Environment or a staff member or student of the Tasmanian Aquaculture and Fisheries Institute to observe fishing operations conducted under this permit.
10. must complete the octopus fishery logbook accurately as provided by the Manager (Wild Fisheries Management) for each day during which fishing occurs.
11. must submit the completed logbooks to Manager (Wild Fisheries Management) every three months through out the duration of the permit.
12. must collect biological and fishery information or record data and information relating to the octopus fishing operation as directed by the Manager (Wild Fisheries Management).
13. must make available 500 traps for research, to be set in an areas determined by the Manager (Wild Fisheries Management).
14. must make available to the Tasmanian Aquaculture and Fisheries Institute a sample per month of up to 100 octopus.
15. must carry a copy of this permit whenever engaged in activities under this permit.
16. must comply with the *Living Marine Resources Management Act 1995* and all regulations and rules made thereunder with the exception of activities authorised by this permit.

Wes Ford  
**DIRECTOR (MARINE RESOURCES)**





**Attachment 4: Tasmanian Octopus Fishery Main Fishing Grounds.**



# Attachment 5: Permit Example, Using A Gillnet



DEPARTMENT of  
PRIMARY INDUSTRIES,  
WATER and ENVIRONMENT

Tasmania

***LIVING MARINE RESOURCES MANAGEMENT ACT 1995***  
**PERMIT ISSUED UNDER SECTION 14**  
**Taking Octopus Using Unbaited Traps**

**PERMIT NUMBER:** <Permit No.>  
**PERMIT HOLDER:** Mr <First Name> <Last Name>  
<Address>  
<Address>  
**DATE OF ISSUE:** <Day-Month-Year>  
**DATE OF EXPIRY:** <Day-Month-Year>

**ACTIVITIES AUTHORISED BY THIS PERMIT:**

This permit is issued for the purposes of the development of fisheries technology. It authorises the permit holder to set, use or leave a graball net or other authorised gear in State waters of Eaglehawk Bay to take and possess octopus (*Octopus maorum*) from the fishing vessel <Vessel Name> (<Distinguishing Mark>) in accordance with the terms and conditions set out below.

**CONDITIONS**

It is a condition of this permit that the permit holder: -

1. must only undertake activities authorised by this permit in State waters of Eaglehawk Bay.
2. must not set, use or leave a graball net in Eaglehawk Bay for more than 12 hours at any one time.
3. must not set, use or leave a graball net in Eaglehawk Bay on Saturday nights, specifically between one hour after sunset on Saturday nights and one hour before sunrise on Sunday mornings.
4. must not set, use or leave a graball net in Eaglehawk Bay on Easter Friday, Easter Saturday and Easter Sunday, and on 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> of December.
5. must not use more than a total of 400 metres of graball net in Eaglehawk Bay.
6. must not use a graball net that exceeds 200 metres in length in Eaglehawk Bay.

7. may apply in writing to the Manager (Wild Fisheries Management) for written approval to trial other forms of fishing apparatus to take octopus.
8. must return to the water as soon as practical and with as little damage as possible, any by-catch, scalefish or invertebrate species taken whilst operating under this permit.
9. must record any by-catch in the manner and form described by Attachment 1, the By-Catch Data Collection Form.
10. must forward to the Manager (Wild Fisheries Management), facsimile number 6223 1539, within one week following the end of each month the completed By-Catch Data Collection Form for each months fishing activities, and keep records that prove that the facsimile transmission was completed successfully.
11. must document and supply to the Manager (Wild Fisheries Management), within one week of the expiry of the permit period, a summary of any fishing trials conducted under condition 8 of this permit.
12. shall permit any officer from the Department of Primary Industries, Water and Environment to have access at any reasonable time to the fish taken, vessels and to any records relating to activities under this permit.
13. must carry a copy of this permit whenever engaged in activities under this permit.
14. must comply with the *Living Marine Resources Management Act 1995* and all regulations and rules made there under with the exception of activities authorised by this permit.

Steven Kons LLB MHA  
**MINISTER**