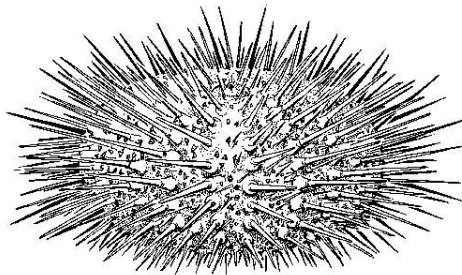


**STATEMENT OF MANAGEMENT ARRANGEMENTS
FOR THE VICTORIAN SEA URCHIN FISHERY
(*Heliocidaris erythrogramma* & *Centrostephanus
rodgersii*)**



**Statement prepared for the Australian Department of Heritage
and Environment**

**for the purposes of Part 13(A) of the *Environment Protection
and Biodiversity Conservation Act 1999***

**Prepared by Fisheries Victoria Division of the
Department of Primary Industries, Victoria
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STATEMENT OF MANAGEMENT ARRANGEMENTS FOR THE VICTORIAN SEA URCHINS FISHERY (*Heliocidaris erythrogramma* & *Centrostephanus rodgersii*)

1. FOREWORD

Victoria's fisheries resources are a public asset and are available for recreational and commercial harvest, subject to the provisions of the *Fisheries Act 1995* and subordinate legislation. Fisheries Victoria, a division of the Department of Primary Industries (DPI) is the steward of the State's fisheries resources and as a regulatory authority, the Department is responsible for the sustainable development of these resources. Fisheries Victoria seeks to ensure that utilisation of fisheries stocks is sustainable and impacts on the broader ecosystem are minimised to balance the diverse needs of the community and a wide range of interest groups.

Fisheries management is a challenging task that generally has to be achieved in an environment of imperfect knowledge about fish stocks and fisheries ecosystems. In an environment of uncertainty, a precautionary approach to resource management will be required. The following statement of management has been compiled to summarise the Department's management strategies that ensure the ongoing sustainability of sea urchins (*Heliocidaris erythrogramma* & *Centrostephanus rodgersii*) stocks in Victoria.

2. PURPOSE OF THIS REPORT

The aim of this Statement of Management Arrangements is to outline the management arrangements for the Victorian sea urchin fishery. Because the fishery is a small, low value, developing fishery with only a small number of permit holders as participants, the development of a formal fishery management plan was deemed to be unnecessary.

Members of the Victorian sea urchin industry have indicated that they wish to obtain export approval under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) for Victorian sea urchin in anticipation of establishing export markets for sea urchin products in the future.

This Statement of Management Arrangements for the Victorian sea urchin fishery has consequently been developed to seek Commonwealth Government declaration that sea urchins (*Heliocidaris erythrogramma* & *Centrostephanus rodgersii*) taken from Victorian waters are listed as exempt native species for export, under Part 13(A) of the *EPBC Act*.

3. BACKGROUND

3.1 Sea Urchin Commercial Harvesting and Markets

Sea urchin roe (gonads) is a highly priced seafood delicacy in many Asian countries, particularly Japan and some European countries. In 1996, Japan imported over \$360 million worth of sea urchin roe¹. Victoria has six species of sea urchins, two of which are targeted commercially. *Centrostephanus rodgersii*, a large dark purple urchin with long spines, is found in eastern Victoria, north eastern Tasmania and southern NSW. *Heliocidaris erythrogramma*, a light purple green or creamy white urchin with dark spines, is distributed throughout Victoria and along Tasmania's east coast. Both species are similar to urchins exploited in overseas fisheries, although Australia contributes little to the Asian urchin market. Although Australia has extensive stocks of sea urchins in our waters, they remain under-utilised as a commercial resource.

The coastal waters adjacent to Victoria contain naturally occurring stocks of *Heliocidaris* (recorded in Victorian catch records as white urchin) and *Centrostephanus* (recorded as black/purple urchin). *Centrostephanus* is common in south east Australian waters, inhabiting sub-tidal reef areas from 0–35m depth along open coasts. *Heliocidaris* is less common and is found over a similar depth range in more sheltered reef environments. Port Phillip Bay (Area 11 shown in Appendix 1) and East Gippsland (Areas 22-24 shown in Appendix 2), particularly Mallacoota, are the two main fishing areas although these represent only a small percentage of overall rocky reef urchin habitat in Victoria.

Urchins are harvested by hand by commercial fishers using compressed air diving equipment and long metal tongs to remove urchins from reefs. This harvesting method imposes minimal impact on the environment and conflicts with other fishing activities are negligible. The fishery is centred around periods just prior to spawning when the roe quality is at its best quality. This generally occurs from June to January for *Heliocidaris*, followed by February to July for *Centrostephanus*.

DPI has issued experimental permits for the urchin fishery since the early 1970's. Economic viability of the Victorian fishery has been marginal since its beginnings, and like South Australian and Tasmanian urchin fisheries, has been limited in its development due to the variation in roe quality, the consequential effect on profitability for permit holders, and limited acceptance of Australian urchin species among the more lucrative Asian markets. The criteria for roe quality assessment are size, texture, granularity, and colour, and the product is graded accordingly for sale. Roe recovery rates differ within batches of urchins, and fluctuate seasonally, between species and among sites. For example, large *Centrostephanus* are abundant in eastern Victoria and give greater roe yield (20–24 urchins yield 1kg roe at Mallacoota) than the *Heliocidaris*.

¹ *SARDI Puts Sea Urchins on a Diet*, 28 March 2000, South Australian Research and Development Institute, www.sardi.sa.gov.au

3.2 The commercial catch

The total harvest of urchins has ranged from 44 tonnes in 1996/97 to 69 tonnes in the following year (Table 1). Since that year, catches have been relatively stable at around 50 to 60 tonnes.

In terms of individual species, the annual catch of the black urchin, *Centrostephanus*, rose from 2 tonnes in 1996/97 to 19 tonnes in the following year. Catches remained stable at around 20 tonnes until 2002/03 when they reached 39 tonnes. In 2003/04, the annual catch was again 20 tonnes (Table 1). The annual catch of the white urchin, *Heliocidaris*, has been variable, ranging from 19 to 50 tonnes. No pattern of increasing or declining catch is evident for either species (Table 1).

Table 1. Production of Victorian sea urchin (live weight, tonnes)^A

Year	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04
<i>Centrostephanus</i> (Black urchin)	2	19	25	18	21	21	39	20
<i>Heliocidaris</i> (White urchin)	42	50	31	45	32	26	19	37
Total	44	69	56	63	53	47	58	57

^A rounded up to whole numbers

Stocks of *Heliocidaris* in the East Gippsland region are targeted by local permit holders as they have a higher market value than *Centrostephanus* found in the same area. Industry advice is that the value of Victorian sea urchin roe sold directly to Victorian wholesalers ranges from an average of \$80/kg for 'A' grade white urchin roe to an average of \$40/kg for the black/purple urchin roe. During 2004/05 the commercial value of the annual catch was AUD\$414,000.

The predominant market for Victorian sea urchin roe continues to be domestic processing and sales. The majority of Victorian urchin produce is sold on the local market to seafood wholesalers/processors and restaurants, specialist processors in Melbourne and NSW, and privately to local individuals, particularly Australians of Maori descent, for personal consumption.

Because urchin roe sold on the Japanese market would command a much higher price when compared with the Australian domestic market, the incentive persists for the industry to develop export markets, particularly in Asia. However, Australian sea urchin roe must compete with roe produced by other countries where roe recovery rates are higher, the urchin species are more desirable, and their urchin products are associated with reputable brand names that are already well established in the Japanese marketplace.

Despite these obstacles, product development initiatives are underway to establish Victorian product on the international market. For example, the Eastern Victorian Sea Urchin Diver's Association Inc (EVSUDA), established in 1997 and representing 8 of 13 members in East Gippsland, has recently been the successful applicant of a new industry development grant, which is being used to pursue export opportunities for

the sea urchin industry. It is expected that any impact on the international market share is likely to develop at a steady pace that allows for concurrent development of fishery management measures.

3.3 The recreational and indigenous catch

The recreational and indigenous urchin catch is unknown but thought to be negligible. The National Recreational and Indigenous Fishing Survey did not report any urchin catch specific to Victorian recreational fishers. Anecdotal evidence suggests that small quantities of sea urchins from waters mostly within the central Victorian coastal area close to Melbourne are taken by Victorians of Polynesian descent such as Maori and other South Pacific Islanders.

4. BIOLOGICAL AND LIFE HISTORY CHARACTERISTICS OF THE SEA URCHIN

Sea urchins are marine invertebrates that inhabit sub-tidal rocky reef and belong to the Phylum Echinodermata and Class Echinoidea. Sea urchins have a hard external skeleton or 'test' that protects the body and organs. The test is covered in numerous spines, both tapered and blunt, that an urchin can move in a co-ordinated fashion to propel itself around rocks and crevices. The two species, *Heliocidaris erythrogramma* and *Centrostephanus rodgersii*, differ in that *Centrostephanus* has hollow spines while *Heliocidaris* has solid spines. The two are also different in colour, as stated previously.

Urchins are herbivores with a mouth located underneath the test that they use to actively graze at night on leafy (foliose) algae. *Centrostephanus* exhibit a voracious appetite for macroalgae and can create 'barrens', areas of bare 'white' rock (sandstone and granite) devoid of vegetation. This results in loss of habitat for other herbivores such as abalone. In this functional ecological role, urchins are sometimes classed as habitat modifiers and are a key component of their respective ecosystems. Competition/density relationships with abalone, contrastingly classed as habitat responders, have been the subject of various experimental field studies in NSW and overseas².

Sea urchin spawning is believed to be triggered by the presence of warmer water ($\geq 17^{\circ}\text{C}$) and is asynchronous among individuals. It is not known how often within a season an individual urchin will spawn. In Victoria, spawning in Port Phillip Bay is known to occur from December to March³. Like most broadcast spawners, recruitment is highly variable from year to year and, like many other biological processes in urchins, has not been extensively studied.

Sea urchin predators can include octopus, southern rock lobster, Port Jackson sharks and some scalefish such as leatherjackets and snappers. There have been

² Hill, NA et al. (2003) Grazing effects of the sea urchin, *Centrostephanus rodgersii*, in two contrasting rocky reef habitats: effects of urchin density and its implications for the fishery. *Marine and Freshwater Research* 54: 691-700

³ www.edaff.gov.au/nfpd/atals **Purple sea urchin** reproduced from the book *Australian Fisheries Resources* published in 1993 by the Bureau of Rural Sciences and the Fisheries Research and Development Corporation. Compiled by Patricia Kailola.

various ecological studies during recent years to investigate the relationship between urchins and other reef species such as abalone and rock lobster. Some studies indicate sea urchin densities are often higher where abalone and southern rock lobster numbers are low or non-existent⁴

5. MANAGEMENT ARRANGEMENTS OF THE VICTORIAN SEA URCHIN FISHERY

5.1 Context of the Management of the Commercial Fishery

The sea urchin developing fishery is managed within the broader relevant objectives of the *Fisheries Act 1995* which are:

- i) to provide for the management, development and use of Victoria's fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner;
- ii) to protect and conserve fisheries resources, habitats and ecosystems including the maintenance of aquatic ecological processes and genetic diversity; and
- iii) to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations.

The sea urchin fishery was declared a Developing Fishery by a Ministerial Direction in 1998 and subsequently twenty four general permits for sea urchin harvesting were issued under section 49 of the *Fisheries Act 1995* in 1998 for a three year period.

In response to a recognised large component of latent effort within the fishery, and to encourage development of the fishery, these permits were issued with a condition that required permit holders to meet minimum harvesting requirements of 3000kg/year. This minimum harvesting requirement is conservative and based on the catch rate of 150kg/day. To achieve this rate, a person would, on average, need to dive only 20 days per year to meet the licence condition. This condition aims to ensure a minimum level of activity by permit holders, so that future management decisions may be made on an appropriate level of fishery dependent (catch) information. There is no upper limit imposed.

Following an internal Departmental review of the fishery in December 2002, it was determined that, given the relatively small size and value of the fishery and low level of participation, continuing to manage the fishery as a developing fishery by permit was the most appropriate option. Further, it was decided that a failure to meet specified permit conditions (in particular the minimum annual catch) would result in the non-renewal of the permit. Approximately ten permits were removed from the fishery in this way and there are currently fourteen permit holders remaining.

⁴*Ibid*

The nature of the fishery is that it generally provides a supplementary source of income, particularly in East Gippsland, with some permit holders being authorised divers in the commercial abalone fishery.

Given the developmental nature of the fishery and small number of participants, consultation with the urchin industry occurs via informal structures. In general terms, consultation on significant management issues for the urchin fishery will be through the commercial fishing peak body in Victoria, Seafood Industry Victoria, permit holders for Port Phillip Bay and the EVSUDA.

5.2 Catch and Effort Controls for the Commercial Fishery

The limited number of permits authorising holders to harvest commercial quantities of sea urchins sale is the primary input control for the fishery. There are 14 general permits currently issued to individuals to take sea urchins for a period of 1–3 years. Eleven of these permits authorise the holder to fish for sea urchin in Victorian coastal waters east of Lakes Entrance. The other 3 permit holders are authorised to fish for sea urchin in Port Phillip Bay waters (except within the intertidal zone which is defined as less than 2 metres depth of water).

Permit conditions include specification of a permitted area and method of operation, requirements for prior reporting of intended fishing activity, recording catches on forms in the official logbook provided by DPI and submitting these return forms to DPI on a monthly basis. The Executive Director, as delegate of the Secretary, may vary or cancel the permit or permit conditions as necessary including in the instance of a breach of permit conditions.

The permit conditions are as follows:

- (a) AREA: Port Phillip Bay only (or Victorian waters east of lakes Entrance).
- (b) The permit holder may only take sea urchins by diving.
- (c) Failure to comply with any condition of this permit may render it liable to cancellation.
- (d) The issue of a new permit upon the expiry of this permit will be dependant on any Ministerial Direction or other policy specific to the fishery current at that time.
- (e) The provisions of the Fisheries Act 1995 and Regulations are to be observed except where exemption is specifically provided for in the permit.
- (f) No operation shall commence without prior notification being provided to the Duty Officer by telephone, detailing the name of permit holder, permit number, location, time of collection, boat number and target species.
- (g) Any boat used in the collection of sea urchins must be registered for commercial fishing in Victorian waters.
- (h) This permit does not confer the right to enter any water within a national park or other parks, a wildlife reserve, a Fisheries Reserve or any other marine protected area. This permit does not preclude the need to obtain permission from other appropriate authorities.

- (i) If the permit holder does not take and sell 3000 kilograms of sea urchins in each of the three years that this permit remains current, then the issue of any further permits may be refused.
- (j) This permission may be cancelled at any time by notice in writing for contravention of any of the above conditions.
- (k) A copy of this permit must be carried at all times during authorised fishing operations and made available for inspection
- (l) It is the responsibility of the permit holder to maintain accurate records and provide an accurate return on the form provided once every month to be forwarded no later than the 14th day of the following month. Catch and Effort records must be forwarded to the Catch & Effort Section, PIRVIC, PO Box 114, Queenscliff, 3225 on the forms provided.

The EVSUDA has produced a draft Code of Practice for sea urchin harvesting that encourage a number of voluntary industry actions intended to maintain sustainability within the fishery in the eastern part of the state. It promotes voluntary actions such as:

- Divers shall make every reasonable effort to not harvest urchins below the following sizes:
 - *Heliocidaris* –minimum test size 65mm,
 - *Centrostephanus* - minimum test size 100mm
- EVSUDA shall seek to develop an appropriate measuring device that divers shall be required to have on board their fishing vessel by mid 2005.
- Divers to select urchin that are likely to produce roe of high quality and yield, so as to obtain the greatest benefit from urchins harvested.
- Processing on board will assist in ensuring that urchins of high quality and yield are being selected and utilisation of the resource is being maximised.

During recent years, several applications have been received from individuals interested in obtaining a permit to harvest sea urchins. Permit applications from new individuals are considered within the objectives of maintaining a sustainable resource. This includes consideration of what is known about the sustainability of the resource and current and potential levels of participation, harvesting and markets. Fisheries Victoria's response has been to decline all applications, based on the 'precautionary principle' because, although harvest levels may be conservative, we have only a basic knowledge about the available biomass and sustainable harvesting levels (to be discussed below).

5.3 Reference Points for the Commercial Fishery

The total commercial catch is monitored annually as part of the production of Fisheries Victoria's annual *Commercial Fish Production Information Bulletin*. Historically, the market and the quality of the roe have determined how much, and when, sea urchin is harvested.

A noticeable increase or decrease in total catch across the fishery will trigger an informal review of current management measures, in consultation with the fishing industry. The *Fisheries Act 1995* provides the ability to quickly close a fishery

(prohibit the taking, processing selling etc. of the species) on a spatial, temporal or gear-specific basis by 'Fisheries Notice' under sections 67 and 152 of the Act.

In terms of monitoring catches by region or area, a study on the density, size-structure and roe quality of sea urchins in Port Phillip Bay, eastern Victoria and NSW was conducted by NSW Fisheries in conjunction with PIRVic⁵. The results of this study have been used to set reference points for commercial catches in two areas (Area 11 and 24) of the Victorian fishery.

Information collected on the density of each species from surveying numerous fixed sites in each region was combined with estimates of the area of available habitat to calculate the probable biomass of sea urchins. Biomass estimates were obtained *Heliocidaris* within Port Phillip Bay and for *Centrostephanus* and *Heliocidaris* in eastern Victoria.

In Port Phillip Bay, the total biomass of the *Heliocidaris* was estimated as 9,100 tonnes. This includes 4,800 tonnes on reef with macro-algae, although if Portarlington is excluded (i.e. because of uncertainty over changes in reef area), the estimate is 3,000 tonnes, and an additional 4,300 tonnes on bare reef. The populations on bare reef are harvested intermittently but are generally avoided due to a high proportion of individuals (~45%) with non-marketable roe (Blount & Worthington 2003). Harvesting on bare reef is likely to increase in the near future, however, as urchins will be collected for an on-growing aquaculture venture. 'Port Phillip Bay' in Blount and Worthington (2003) corresponds to Area 11.

In eastern Victoria, the total biomass of the black urchin, *Centrostephanus*, was estimated as 3,300 tonnes compared to 1,500 tonnes for the white urchin, *Heliocidaris* (Blount & Worthington 2003). In Blount and Worthington (2003), 'eastern Victoria' covers an area from Sandpatch Point to Cape Howe, which corresponds to Area 24.

The findings from Blount and Worthington (2003) suggest that annual catches of 1 to 5% of the unexploited biomass of *Heliocidaris* and *Centrostephanus* should be sustainable. Fisheries Victoria has considered these findings and after consultation with the industry, has decided to implement a 5% reference point for both *Heliocidaris* and *Centrostephanus*. This reference point is still considered highly conservative but recognises the developmental nature of the fishery and the opportunity for future industry growth.

Reference points are provided in terms of biomass in Table 2.

⁵ Worthington, D and Blunt, C. (2003) *Research to develop and manage the sea urchin fisheries of NSW and eastern Victoria*. NSW Fisheries Final Report Series No. 56. FRDC Project No. 1999/128

Table 2. Reference points as estimates of total biomass (tonnes)^A

Area		Area Code 11	Area Code 24
<i>H. erythrogramma</i> (White urchin)	Total biomass	3,000 ^B + 4,300 ^C	1,500
	1% reference	150 ^B + 215 ^C	15
<i>C. rodgersii</i> (Black urchin)	Total biomass	Not estimated	3,300
	5% reference		165

^A biomass estimates for reference points assume that the estimates of total biomass made by Blount and Wothington (2003)

are close to unexploited levels.

^B biomass on reef with macroalgae, excluding Portarlington

^C biomass on bare reef

In terms of historical catches by zones, the catch of *Heliocidaris* in Port Phillip Bay (Area 11) dropped from around 40 tonnes in 1996/97 and 1997/98 to 17 tonnes in 1999/2000. Catches remained around 20 tonnes until 2002/03 when they dropped to 11 tonnes. In 2003/04, there was an increase to 28 tonnes (Figure 1). This is close to the reference point of 30 tonnes for *Heliocidaris* on reef with macroalgae in Area 11 (Table 2) so catches will need to be monitored closely. Monitoring catches on vegetated versus non-vegetated reefs will be required when harvesting on bare reef commences in order to apply the two reference points (Table 2).

The catch of *Heliocidaris* in eastern Victoria (Area 24) increased from a low of 2 tonnes in 1996/1997 to 23 tonnes in 1999/2000 before dropping to 6 tonnes in the following year. Since then, catch has been stable around 3-5 tonnes (Figure 1). This is currently below the reference point of 15 tonnes for Area 24 (Table 2).

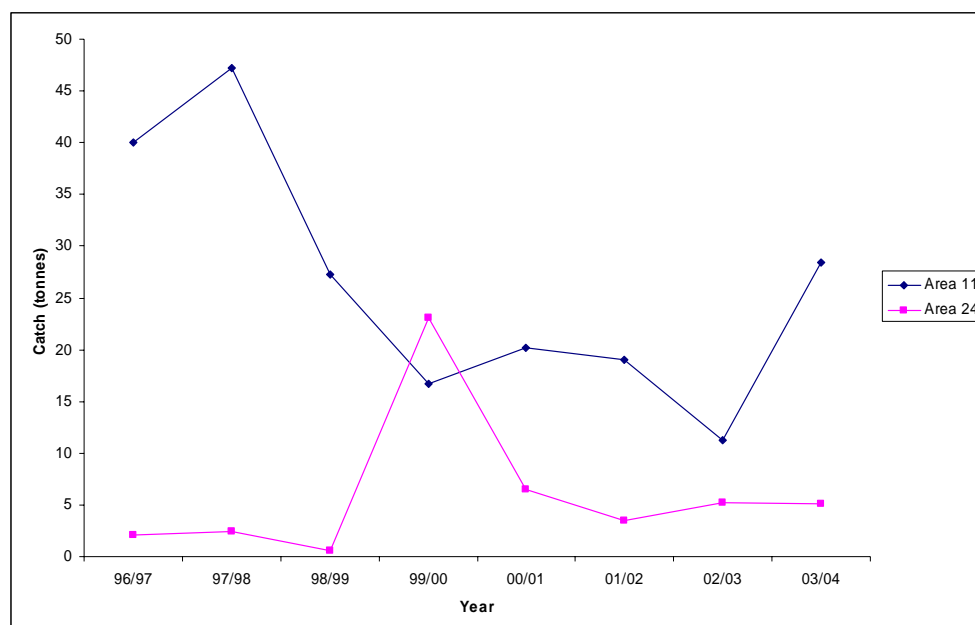


Figure 1. Catch of *Heliocidaris* in Port Phillip Bay (Area 11) and east Victoria (Area 24)

The commercial catch of *Centrostephanus* in eastern Victoria (Area 24) increased from a low of 2 tonnes in 1996/1997 to 17 tonnes in 1997/98 and then remained

stable around 20 tonnes for a number of years before increasing to 33 tonnes in 2002/03. In 2003/04, catch dropped back down to 20 tonnes (Figure 2). This is significantly below the reference point of 165 tonnes for Area 24 (Table 2).

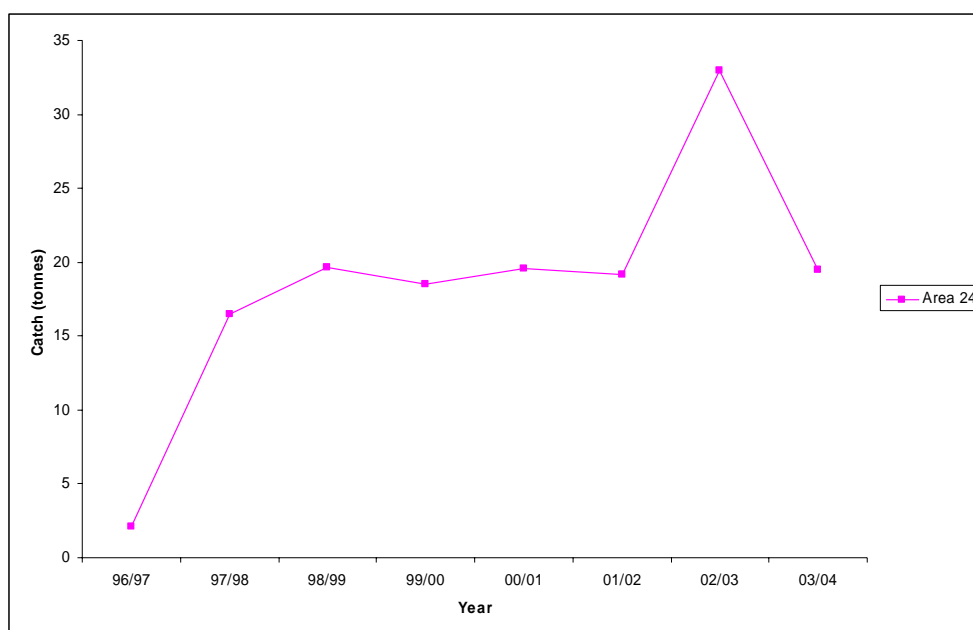


Figure 2. Catch of *Centrostephanus* in east Victoria (Area 24)

As well as limiting catches, the sustainability of *Centrostephanus* and *Heliocidaris* populations in eastern Victoria and Port Phillip Bay may depend on the ability to control the spatial distribution of catches and, hence, prevent localised and serial depletion. *Heliocidaris* is particularly vulnerable to serial depletion because of limited larval dispersal, which means that depleted populations may not be replenished from neighbouring populations. There is also evidence to suggest low levels of recruitment for both species (Blount and Worthington 2003). Catches may therefore need to be allocated and monitored in proportion to the relative size of the biomass in different areas.

This will be a challenge given the low value of fishery and the likelihood of limited research resources. Nonetheless, in recognition that spatial management is likely to be important in minimising the risk of serial depletion, Fisheries Victoria will investigate potential options to improve spatial management in the fishery by drawing on experiences gained from the abalone fishery. To this end, Fisheries Victoria will investigate the feasibility of a pilot project with dual endorsed abalone-urchin divers in Port Phillip Bay and the eastern part of Victoria aimed at gaining fishery dependent information at finer spatial scales.

A conservative management approach for *Centrostephanus* and *Heliocidaris* in Victoria is required because sea urchin fisheries are inherently vulnerable to over-fishing and there are continuing uncertainties about the productivity of the populations and how stocks will respond to depletion. In addition, the estimates of both species in eastern Victoria assume stocks are independent of those in NSW, which is unlikely (Blount and Worthington, 2003).

5.4 Controls for the Recreational Fishery

A maximum daily catch limit of 20 urchins applies to recreational fishers, prescribed by the *Fisheries Regulations 1998*, and the removal of roe or other soft tissue before being brought ashore is prohibited.

5.5 Fisheries Compliance Service Delivery

Enforcement

Fisheries Officers are employed by the Department of Primary Industries to protect Victorian fisheries. One of their roles is to ensure compliance with fishing regulations. Uniformed and plain-clothes Fisheries Officers constantly perform spot checks all over Victoria, which can result in fines of up to \$120,000 and/or penalties of up to 10 years in jail and confiscation of equipment.

They have extensive powers of search and entry and may stop any boat, or vehicle, in order to carry out inspections. They may also seize any fish, fishing gear or other equipment that has been used in an alleged offence against the *Fisheries Act 1995* including boats and vehicles.

Fines and penalties

Persons found allegedly offending against the *Fisheries Act 1995* are obliged by law to provide their correct name and address. Failure to do so may result in arrest. Minor offences are usually handled by a Penalty Infringement Notice (PIN). More serious offences are processed through the court system.

Education

One of the components of fisheries compliance work is education about regulations. The aim is to increase awareness, understanding and acceptance of fisheries regulations, and therefore, in the longer term, to increase compliance.

Education involves a number of activities, some of which include:

- Promotion of regulations and where to get detailed information about regulations
- Distribution of around 300,000 copies of the annual Victorian Recreational Fishing Guide through over 900 outlets throughout Victoria
- On-site education by Fisheries Officers on patrol
- Schools education via the Get Hooked...It's fun to fish education kit and programs run through the Marine Discovery Centre at Queenscliff

Offence reporting

Other initiatives include the allocation of \$1.05 million over four years to operate an illegal fishing reporting line. 13FISH (telephone 13 3474) is a Statewide 24/7 fisheries offence reporting line which was launched on 8 September 2003. Reports from the community have already led to the conviction of people involved in various serious offences including illegal netting and taking commercial quantities of abalone.

6. RESEARCH AND MONITORING

Quantitative estimates of sea urchin abundance are undertaken by PIRVic as part of annual fishery independent surveys of Victorian abalone communities (the Abalone Assessment Sub Program) at 190 fixed monitoring sites distributed on rocky reefs along the entire Victorian coastline. Urchins, and other prevalent organisms other than abalone, such as sea stars, turban snails and other invertebrates are surveyed, as well as cover abundance of macroalgae and crustose corraline algae.

In addition, the “Victorian Marine National Parks and Sanctuaries Intertidal and Subtidal Reef Monitoring Program” established by Parks Victoria and the Marine Strategy Unit of the Victorian Department of Environment and Sustainability has begun to accumulate baseline data to provide information on the status of Victorian reef flora and fauna. The sub-tidal reef monitoring program includes survey sites inside and outside thirteen marine national parks and marine sanctuaries. The intertidal monitoring program initiated in 2003 includes monitoring sites established inside and outside eight marine national parks and sanctuaries⁶, although the majority of sites are restricted to the central Victorian coast.

As data sets accumulate and are analysed, the nature and magnitude of trends in species abundance and diversity through time can be elucidated.

All three monitoring programs discussed above use similar techniques involving environmentally benign underwater visual census techniques along transects applied over a scale of 10’s to 100’s of metres.

A current research project by PIRVic will undertake surveys to measure interactions among abalone and other ecosystem components (including urchins) on the scale of 2 metre x 2 metre quadrats. These quadrats will be randomly placed on individual reefs within each of the major fishery regions. Sampling will also be conducted in marine parks for a comparison of species interactions with fished areas. Correlations between abalone and other ecosystem components will therefore be measured at scales relevant to ecological interactions and appropriate indicator species will be identified. This project is will begin in July 2006.

In Victoria, there is already evidence of the creation of small urchin ‘barrens’ in some areas, particularly where *Centrostephanus* is the dominant urchin species. These observations are from Parks Victoria survey sites located within Beware Reef Marine Sanctuary and Point Hicks Marine National Park⁷

7. ENVIRONMENTAL MANAGEMENT

7.1 Bycatch and Environmental Impact

Sea urchin harvesting is done by hand. The sea urchin fishery is a small target specific fishery that does not involve byproduct, bycatch, or interactions with endangered, threatened or protected species.

⁶ P Gilmour et al. (2005) *Marine National Parks and Sanctuaries Intertidal and Subtidal Reef Monitoring Program Status Report*, January 2005. Australian Marine Ecology

⁷ www.parkweb.vic.gov.au Parks Victoria Technical Series No 1 Marine Natural Values Study

The hand collection of urchins causes minimal overall impact upon the seabed and epi-benthos. The gear used by divers is passive and therefore considered environmentally benign. In moderately exposed areas where the urchins tend to inhabit crevices or burrows, there may be some incidental but minor displacement of algae fragments or rocky habitat. However, the small amount of fishing effort spread across a large area of habitat means that such impacts, if and when they occur, will be almost negligible.

Because fishing usually takes place using small, boat-based, hookah diving operations, there is potential for water pollution from oil or petrol spillage, rubbish blown overboard by the wind, and from anchoring vessels on reefs. However, as with harvesting methods, impact from this aspect of fishing would be negligible given the very small number of participants in the fishery and the area over which effort is spread.

Furthermore, the EVSUDA's draft Code of Practice includes actions to avoid or ameliorate potential environmental impact that may be associated with urchin fishing such as:

- Waste management to include the return to shore of all rubbish and other goods taken out on the fishing vessel;
- Re fuelling and oil changes to be carried out on shore to prevent spills;

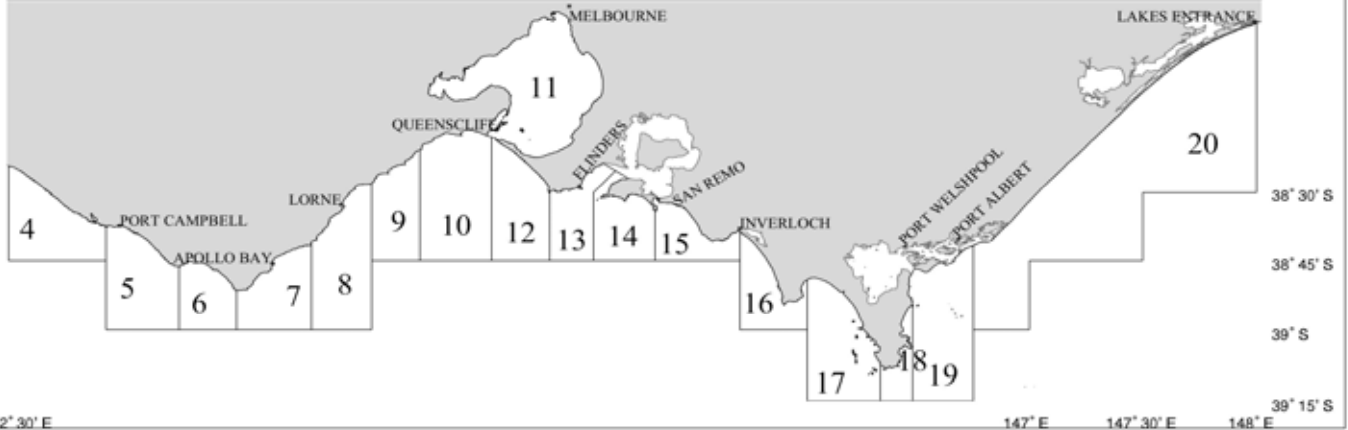
and actions related to general monitoring and reporting such as:

- Reporting of any noticeable change in marine ecology eg. marine pests, species population changes to the local DPI office.

Commercial Permits (Periwinkle and Sea Urchin) – Central Victoria

AREA AND REEF CODES

Area Code	Reef Code	Reef or Area Name	Area Code	Reef Code	Reef or Area Name	Area Code	Reef Code	Reef or Area Name
4		Hopkins River to Point Hesse	11	G	The Gully	14	CB	West Head to Cape Woolamai
5		Point Hesse to Moonlight Head	11	PP	Picnic Point	14	N	Cat Bay
6		Moonlight Head to Cape Otway	11	Y	Yorkies	14	PR	The Nobbies
7		Cape Otway to Cape Patton	11	C	Cerberus	14	WR	Pyramid Reef
8		Cape Patton to Split Point	11	RP	Ricketts Point	14	WR	Woolamai Reef
9		Split Point to Point Danger	11	M	Mordialloc			Cape Woolamai to Inverloch
10		Point Danger to Point Lonsdale	11	F	Frankston	15	SR	San Remo / Kilcunda
		Port Phillip Bay	11	CB	Canadian Bay	15	CP	Coal Point Reef
11	LP	Point Lonsdale to Portarlington	11	MT	Mornington	15	IR	Inverloch Reef
11	GL	Portarlington to Point Wilson	11	SB	Safety Beach			Inverloch to Walkerville
11	PW	Point Wilson	11	P	Portsea	16	IR	Inverloch Reef
11	KP	Kirk Point	11	QS	Quarantine Station	16	CL	Cape Liptrap
11	SO	She Oak	11	A	The Anchor	16	GW	Cape Liptrap
11	PC	Point Cook			Point Nepean to Pulpit Rock			Greenlip or Waratah Reef
11	SD	The Sand Dunes	12	PB	Portsea Back Beach Reef	17	WN	Walkerville to South West Point
11	WR	Wiseys Reef	12	CS	Cape Schanck	17	NI	Waratah Bay to Norman Point
11	S	The Stick			Pulpit Rock to West Head	17	GG	Norman Island
11	FF	Freds Farm	13	CS	Cape Schanck	17	NS	The Glennie Group
11	RR	Rifle Range	13	BR	Bushrangers Bay	17	A	Norman Point to South West Point
11	W	Williamstown	13	FB	Flinders Back Beach	17	A	The Anser Group
11	J	Jawbone	13	WH	West Head Reef	18		South West Point to Monkey Point
11	BB	Brighton Baths				19		Monkey Point to Kate Kearney Entrance
						20		Kate Kearney Entrance to Lakes Entrance



Commercial Permits (Periwinkle and Sea Urchin) – Eastern Victoria

