

# Sea Urchin Fishery Baseline Management Arrangements



Cover image: *Heliocidaris erythrogramma*. Image by Julian Finn, Museum Victoria. Licence by CC BY.

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## Acronyms

<b>CDR</b>	Catch Disposal Record
<b>CPUE</b>	Catch Per Unit of Effort
<b>CPUB</b>	Catch Per Unit of Biomass
<b>CZ</b>	Central Zone
<b>EAC</b>	Eastern Australian Current
<b>EPBC</b>	Environmental Protection and Biodiversity Conservation
<b>EVSUDA</b>	Eastern Victorian Sea Urchin Divers Association
<b>EZ</b>	Eastern Zone
<b>FEED</b>	Fisheries Education and Enforcement Branch
<b>FILS</b>	Fisheries Information and Licensing System
<b>FMS</b>	Fisheries Management and Science Branch
<b>FRB</b>	Fisheries Research Branch
<b>FRDC</b>	Fisheries Research and Development Corporation
<b>IUU</b>	Illegal, Unreported and Unregulated
<b>IVR</b>	Individual Voice Reporting
<b>ITQ</b>	Individual Transferable Quota
<b>GPS</b>	Geographical Positioning System
<b>MOU</b>	Memorandum of Understanding
<b>PPB</b>	Port Phillip Bay
<b>PPBZ</b>	Port Phillip Bay Zone
<b>QMS</b>	Quota Management System
<b>RTO</b>	Registered Traditional Owner
<b>SIV</b>	Seafood Industry Victoria
<b>TACC</b>	Total Allowable Commercial Catch
<b>VMS</b>	Vessel Monitoring System
<b>WZ</b>	Western Zone

# Overview

The purpose of this document is to set out the baseline management arrangements for the Victorian Sea Urchin Fishery.

This document outlines the fishery management arrangements for managing the Victoria's Sea Urchin Fishery (the fishery) under an improved quota management regime. The regime has been designed, in consultation with key stakeholders, to ensure the ongoing long-term sustainability, economic efficiency and cost-effective and participatory management of the fishery.

The sea urchin fishery has been operating as a 'developing fishery' under permits since Ministerial Direction in 1998. Prior to this, the fishery operated in various alternative forms of exploratory fishing under permit.

The current state of knowledge and research for the fishery consists of fishery-dependent catch and effort information, fishery-independent density estimates which are collected annually as a component of abalone abundance surveys and stock assessment information, most recently collected in 2002.

Section 1 provides an introduction to the fishery, including the legislative and fishery-specific objectives which have informed the development of the fishery management arrangements. This section also contains a summary of the fishery and the ecological and life history characteristics of the commercial sea urchin species, *Heliocidaris erythrogramma* (white urchin) and *Centrostephanus rogersii* (black urchin).

Section 2 sets out the baseline management arrangements, created for achieving compliance with the objectives of the Act, the fishery-specific management objectives and other relevant legislation.

The management arrangements set out in this section will apply at the commencement of the new management regime. The existing knowledge of the fishery has informed the development of these arrangements. Given the lack of recent robust stock assessment information and relatively data poor nature of the fishery, a risk-based approach has been adopted.

The framework for developing the fishery beyond the baseline arrangements and towards a more optimal system of management is also summarised in this section. There is scope provided to expand the Total Allowable Commercial Catch (TACC) limits beyond the baseline levels. The data requirements for adjusting TACCs in the future are also outlined in this section.

# Section 1: Introduction

## Legislative framework

The *Fisheries Act 1995* (Vic) (the Act) provides the legislative framework for managing fisheries resources in Victoria. The broad objectives contained in the Act include:

- a) 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;
- b) to protect and conserve fisheries resources, habitats and ecosystems including the maintenance of aquatic ecological processes and genetic diversity;
- c) to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations;
- d) to facilitate access to fisheries resources for commercial, recreational, traditional and non-consumptive uses;
- e) to promote the commercial fishing industry and to facilitate the rationalisation and restructuring of the industry; and
- f) to encourage the participation of resource users and the community in fisheries management.

The development of these management arrangements have been guided by these objectives and in line with a range of fishery-specific management objectives, outlined below.

## Management objectives

In addition to the overarching legislative objectives, a number of fishery-specific objectives for managing the fishery have been developed.

### Objective 1: Long term sustainability

The long term sustainability of the fishery will be secured through:

- Maintaining the total harvest of the resource at levels which ensure the viability of sea urchin populations into the future;
- Precautionary management of the fishery in a way which is responsive to the risk profiles of the different species of sea urchin;
- Managing fishing to minimise impact on the ecosystem and in alignment with other fisheries that interact with the sea urchin fishery; and
- Promoting research on the extent, distribution and productive potential of urchin populations, including interaction between barrens and healthy vegetated habitat.

### Objective 2: Economic efficiency of the fishery

The management arrangements for the fishery intend to ensure the economic efficiency and viability of the fishery through:

- Adopting flexible, tradeable and divisible entitlements which support adjustments in effort over time in response to changes in market and other operating conditions; and
- Supporting spatial resource monitoring and enabling industry-led management in order to prevent the depletion of productive vegetated reef urchin populations with marketable high roe quality.

### Objective 3: Cost effective fisheries and participatory management

Cost effective and participatory management in the fishery will be secured through:

- Ensuring management of the fishery and provision of associated services are efficient, effective and responsive using regulatory approaches which are enabling and incentive-based;

- Implementing enforcement measures which are scalable to the level of perceived risk of non-compliance in the fishery;
- Application of the principle that commercial fishers pay for the cost of services from which they benefit and services that address risks created by their activities; and
- Enabling of participation by fishers and other relevant stakeholders in fisheries management, taking account of the respective responsibilities of government and fishers.

## Ecology & life history characteristics

Sea urchins are herbivorous marine invertebrates that belong to the phylum Echinodermata and inhabit sub-tidal rocky reef. There are a total of six known sea urchin species found in Victorian waters, only two of which are commercially harvested: black (long-spined) sea urchin (*Centrostephanus rodgersii*) and white (or purple) sea urchin (*Heliocidaris erythrogramma*). While only *H. erythrogramma* is currently found in Port Phillip Bay and central Victoria, both *C. rodgersii* and *H. erythrogramma* are found in eastern Victoria. To date, there has been no evidence to suggest either species is present in western Victoria.

Sea urchins at low densities inhabit coastal sub-tidal reefs, predominantly in habitat dominated by leafy (foliose) macroalgae and in depths ranging from <6-10 metres (Worthington & Blount, 2003). At higher densities, sea urchins (particularly *C. rodgersii*) have the potential to significantly alter the structure of sub-tidal communities. This occurs through overgrazing and transforming complex, biodiverse benthic communities into flats dominated by encrusting algae, known as “barrens” or coralline flats (Wright et al., 2005).

Sea urchin density has been attributed as a leading cause to the formation of barrens. However, it has also been suggested that interannual warming events (such as *El nino*) which cause macroalgae dieback, together with the removal of urchin competitors (such as abalone) and predators (such as Southern Rock Lobster, octopus, Port Jackson sharks, and some species of scalefish such snapper and leatherjackets) are also key factors which lead to urchin overgrazing and maintenance of persistent barrens (Williams, 2002).

Given the relatively sedentary nature of urchins, populations are highly spatially structured. Life history traits and population dynamics are therefore highly correlated with localised environmental conditions, ecological interdependencies and ecosystem dynamics (Schroeter et al., 2009). Fertilisation success can be strongly dependent upon local density (Levitan et al., 1992).

### ***Centrostephanus rodgersii* (Black urchin)**

Evidence suggests that *C. rodgersii* is a range expanding species, having migrated south from NSW with the strengthening of the southerly reach of the Eastern Australian Current (EAC) (Ling et al., 2009). *C. rodgersii* spawns in the winter months. Following spawning, *C. rodgersii* have an approximate larval stage of between 3-4 months, which suggests a relatively high potential for widespread settlement and recruitment (Huggett et al., 2005).

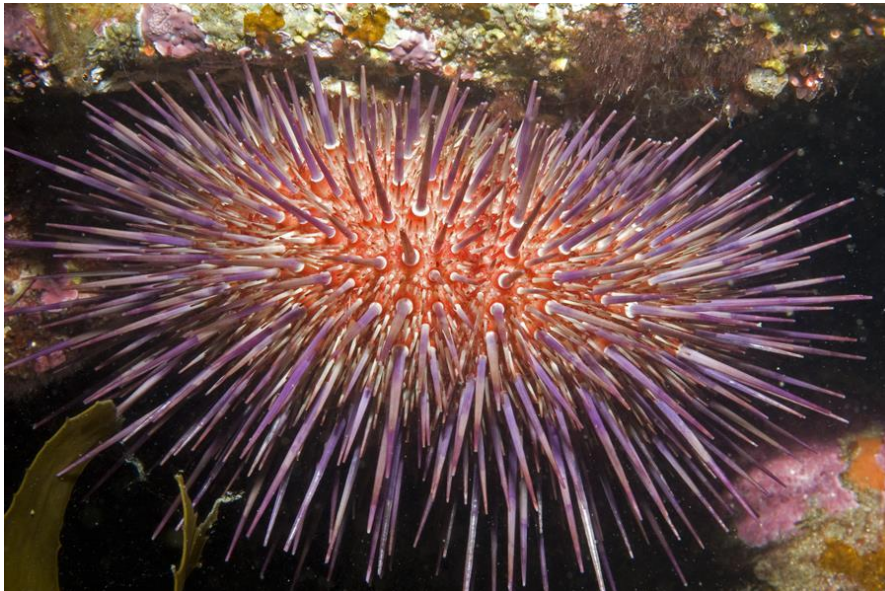


**Figure 1. Black urchin (*Centrostephanus rodgersii*) (Image by Julian Finn. Licence by CC BY)**

### ***Heliocidaris erythrogramma* (White urchin)**

*H. erythrogramma* is endemic to SE Australia, with distribution ranging from the central NSW coast south around Tasmania and across to southern Western Australia. It is a conspicuous herbivore in the shallow sub-tidal zone of NSW and is found to be the dominant herbivore in sheltered sub-tidal rocky habitats between 10-40m deep in eastern Tasmania (Pederson & Johnson, 2008). *H. erythrogramma* feeds on a wide range of sources, including seagrasses, macroalgae, encrusting coralline algae and diatoms (Keesing, 2001). Despite being relatively widespread, little is known of the ecology of the species, including factors affecting recruitment and settlement.

*H. erythrogramma* spawns in summer and is believed to be triggered by waters warming to above 17°C. The beginning of spawning is signalled by the urchin roe changing to a “milky” consistency. Harvesting of roe is suspended during these months until spawning is finished and the roe recovers to a firm texture. *H. erythrogramma* have a short larval life of approximately 3-4 weeks and therefore limited potential for widespread settlement and recruitment, suggesting populations are likely to be highly localised (Worthington & Blount, 2003). These biological traits, together with higher market demand and value, equates to a different risk profile for white versus black urchin and higher susceptibility to overfishing. This highlights the need for a more precautionary approach and different strategies for the management of white sea urchin populations.



**Figure 2. White urchin (*Heliocidaris erythrogramma*)  
(Image by Julian Finn. Licence by CC BY)**



## Section 2: Baseline management arrangements

### Geographical context and fishery management zones

The management arrangements for the fishery will be based on four individual management zones, displayed in Figure 3 below: the Eastern Zone (EZ), Port Phillip Bay Zone (PPBZ), Central Zone (CZ) and the Western Zone (WZ). The EZ extends from Lakes Entrance to the NSW border (encompassing catch area codes 22, 23 and 24). The CZ covers Victorian Waters from Hopkins River to Lakes Entrance at 148°E. The PPBZ is centred on and confined to the area of Port Phillip Bay (encompassing catch area code 11). The WZ extends from the South Australian border to longitude 142°31'E adjacent to the mouth of the Hopkins River near Warrnambool.

These management zones will be the basis for setting and managing the Total Allowable Commercial Catch (TACC) for the fishery.

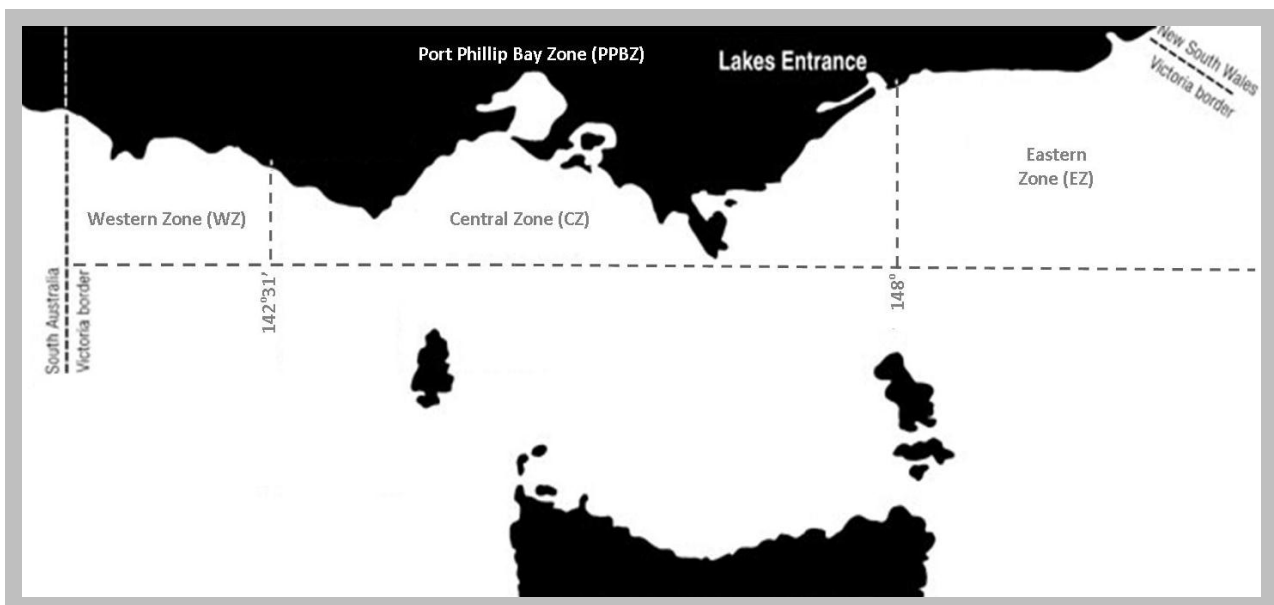


Figure 3. Map of sea urchin fishery management zones

### Spatial management

Spatial management of the fishery will be necessary to support the economic productivity and viability of the fishery. The sustainability of the fishery, specifically white urchin populations in the EZ which are more susceptible to overfishing, will also be supported through the application of spatial management arrangements.

During the initial stages of fishery development, the spatial management arrangements for the fishery will comprise the following key features:

1. Setting and managing the TACC on the basis of individual management zones; and
2. Monitoring catch and effort through the collection of real time, spatially resolute catch and effort data.

At a broad spatial scale, the TACC for the fishery will be set at the level of individual fishing management zones (Figure 1). Catch restrictions by zone will ensure that effort is spread spatially.

At a finer spatial, reef-based scale, monitoring fishery-dependent data will be a key feature of the management regime. Sea urchin populations can vary significantly in abundance, roe quality and quantity between individual reefs ((Worthington & Blount, 2003). This creates the potential for localised serial depletion of productive vegetated reefs with high value roe and greater accessibility, which in turn poses a risk to the economic viability of the fishery.

The reporting framework has been designed to support the collection of catch and effort data which may be linked to spatial information. The collection of this information will be critical to making future TACC adjustments. Collecting information at this more spatially resolute, reef-based level, also provides for the potential to set TACCs at a sub-zonal, reef-based level in the future, noting that any such sub-zonal arrangements should be developed and endorsed by all industry participants and applied on a voluntary basis.

Within each management zone, industry self-management will be the primary mechanism for implementing sub-zonal management, such as setting TACCs at the reef-based level. This would include industry members meeting annually during the quota setting process to discuss how the proposed quota for each zone would be harvested from individual reefs. The agreed quantities to be harvested from each reef would then be recorded in a Memorandum of Understanding (MOU). In the future, stronger regulatory tools, such as fisheries notices to close harvesting from specific reefs or larger areas, may be required where sustainability concerns arise. Stronger controls may be warranted more for white urchin in the EZ given the higher risk profile and greater need for precaution for this species.

### Total Allowable Commercial Catch (TACC)

The TACC will be set and managed by individual management zone on the basis of the estimated abundance, or biomass, of sea urchin.

The most recent stock assessment for both *H. erythrogramma* and *C. rodgersii* was conducted in 2002 (Worthington & Blount, 2003). However, this assessment covered PPB and only one section of the EZ (management area 24). In order to get a better understanding of sea urchin abundance to inform the TACC setting for the fishery, an analysis of density estimates has been undertaken. The density estimates which formed the basis of this analysis were collected as part of annual fishery-independent surveys of abalone abundance. Urchin biomass was subsequently estimated by extrapolating the urchin density estimates from these surveys.<sup>1</sup>

The urchin biomass estimates provided in Table 1 below represent the best available information on fishable biomass.

**Table 1. Estimates of total fishable biomass (whole weight in tonnes)<sup>1</sup> for *H. erythrogramma* and *C. rodgersii*, by management zone**

Species	Eastern Zone (EZ)		Port Phillip Bay Zone (PPBZ)
<i>H. erythrogramma</i>	Area 22	984	
	Area 23	388	
	Area 24	1,500	
	<b>TOTAL</b>	<b>2,872</b>	<b>3,000<sup>2</sup></b>
<i>C. rodgersii</i>	Area 22	29	
	Area 23	461	
	Area 24	3,300	
	<b>TOTAL</b>	<b>3,790</b>	<b>N/A</b>

1. Biomass estimates from Area 24 are based on Worthington and Blount (2003) and include biomass on vegetated reef only (not barrens). Biomass estimates from Areas 22 and 23 are derived from quantitative density estimates collected between 2001-2013 as part of annual abalone abundance surveys, and, by applying a factor, represent biomass on vegetated reef only.
2. Biomass estimate on reef with macroalgae, excluding Portarlington (due to uncertainty around reef area). Including Portarlington the biomass would be 4,800 tonnes. Excluded from this estimate is biomass on bare reef ("barrens") that is not commercially viable and should be excised for the purpose of TACC setting at this stage.

Fishable biomass is characterised as the biomass of sea urchin on productive, vegetated reef. The urchin biomass on barrens is generally of poor commercial quality and therefore has not been considered fishable biomass capable of providing regular catch towards a TACC. The inclusion of barren or poor quality urchin

<sup>1</sup> Urchin biomass was calculated by extrapolating the sea urchin density estimates. Density estimates at a 90% confidence level (10% risk) were recalculated using the geometric mean to normalise data and ensure the results were less affected by large differences over the sampling period. Total biomass was calculated by multiplying density by total reef area and average size per individual (calculated using data from research conducted by Worthington and Blount, 2003). Finally, a factor to calculate the urchin biomass on vegetated reef has been applied to the biomass estimates derived from the abalone abundance surveys.

populations in the overall fishable biomass may be considered in the future if industry develops cost effective systems to 'value add' poor roe quality urchins using special feeds and diets. To date this has not occurred and, as such, the biomass of poor roe quality urchins should not contribute to the TACC at this stage.

Initially and until more recent, fine-scale biomass information becomes available, the TACC will be set on the basis of the catch limit reference points outlined in Table 2 below.

**Table 2. Limit reference points and TACC (whole weight in tonnes)**

	Limit reference point (% biomass)	TACC (tonnes)
<b>Port Phillip Bay</b>		
White urchin	2% biomass	60
<b>Eastern Zone</b>		
White urchin	2% biomass	57
Black urchin	3% biomass	114

Adopting a more precautionary approach and conservative reference point for white urchin accounts for the higher vulnerability and susceptibility of white urchin to overfishing. The higher vulnerability of white urchin is driven by the relatively limited recruitment potential and higher market value and demand for the species.

Until research is undertaken to provide empirical evidence of available fishable biomass in the WZ and CZ, the TACC will initially be set at zero for these zones.

### Framework for adjusting the TACC

A framework has been developed for making adjustments to the TACC as the value and size of the fishery develops. This multi-level approach to adjusting the TACC will involve a progression from low cost, low yield at Level 1 (baseline arrangements) to higher cost, optimum yield at Level 3. The process will be industry-led with any increases to the TACC to be proposed by licence holders, subject to data collection requirements and approval by the Department. There will be no requirement for industry to develop the fishery beyond baseline TACC levels (Level 1).

Although the same methodological framework will apply to both species of urchin, more moderate adjustments of the TACC may be warranted for white urchin in response to the higher risks and potential for overfishing of this species.

At Level 1, the main data collected will be fishery-dependent information mandated by reporting requirements. Where this is the only data collected, the TACC may only be reviewed after an initial four years of fishing (noting that the TACC may be adjusted sooner at Level 2 given collection of additional, fishery-independent data). This period of time will allow a minimum period of data collection and analysis under the new management arrangements. Assuming the availability of at least 4 years of data to support the analysis, adjustments will be made in consultation with industry and in response to standardised reef-based catch rates (CPUE). Adjustments may be either positive or negative, depending on the CPUE trending.

Adjustments to the TACC may be made before 4 years have elapsed and more frequently at Level 2. Adjustments at this level will be possible where information in addition to fishery-dependent data has been collected through fishery-independent surveys. Licence holders will be required to invest in the collection of fishery-independent survey data.

At Level 3, the fishery is represented by a time series of high quality data and yield optimised, the TACC will be adjusted in response to modelling of stock status.

The framework for adjusting the TACC has been summarised in Table 3, as follows. More detail on the requirements for data collection and analysis are described for each level of the fishery in Appendix A.

**Table 3. Summary of TACC adjustment framework**

	Level 1	Level 2	Level 3
<b>Data type</b>	Mandatory fishery-dependent data	As for Level 1 <u>plus</u> Fishery-independent survey data	As for Level 1 and 2 <u>plus</u> A time series of data
<b>Analysis and assessment</b>	Trends in standardised reef-based CPUE	Survey and additional data	Modelling
<b>Change to TACC</b>	Increase after an initial period of four years of fishery-dependent data collection	Scope for more frequent change in response to collection and analysis of empirical data	TACC adjusted in response to outputs of stock status model
<b>Potential yield</b>	Low	Moderate to high (if supported by assessment)	Optimised
<b>Cost to licence holder</b>	Low	Moderate	Higher

This framework is intended to facilitate industry-led development of the fishery and to ensure a risk-based and informed approach to adjustments in TACC levels and continued support for fishery-specific management objectives.

These requirements for setting, monitoring and reviewing the TACC, management objectives, and associated reference points, will be outlined in the harvest strategy for each management zone. Development of the harvest strategy will be undertaken by licence holders with guidance from the Department and the 'National Guidelines to Develop Fishery Harvest Strategies' (Sloan, 2013). As the TACC is proposed to be reviewed every 4 years under the baseline (Level 1) management arrangements, it is anticipated that a harvest strategy will be developed prior to this (i.e. before June 2018).

## Reporting

Catch and effort reporting in real-time is critical in quota managed fisheries to ensure the overall integrity of the Quota Management System and compliance with TACC limits.

The reporting framework for the fishery will be comprised of the following components to provide validation of catch and effort reporting, for compliance purposes and to ensure safety while at sea:

1. Pre-fishing reporting;
2. Catch and effort reporting;
3. Pre-landing reporting; and
4. Post landing reporting.

In addition to supporting the QMS, these reporting arrangements will benefit the management arrangements for the fishery in a number of ways:

- Provide spatially validated fishery-dependent data to support future review and adjustments to the TACC;
- Support the productivity, economic viability and sustainability of the fishery, and in particular, preventing overfishing of more vulnerable EZ white urchin populations;
- Result in cost-effective and efficient compliance;
- Provide better and more efficient access by entitlement holders to their data so that business activities and fishing operations can be planned and monitored; and

- Streamline catch and effort reporting and data management (including removal of paper-based logbooks, SMS reporting and associated data transcription costs) while minimising disruption to fishing activities.

A Smartphone 'reporting application' (the App.) will be utilised to support catch and effort reporting and activity notification. Reporting using this system will allow for up-to-date catch information against quota to be maintained and communicated to the Department and the licence holder. This will avoid the risks of overfishing catch limits that exist with the current system of monthly catch returns.

The App. will enable entitlement holders to manually enter catch and effort information. The App. will also be designed to support spatial validation of catch and effort information through the automatic capture of location (GPS coordinate) and overlay of depth information<sup>2</sup>.

The Smartphone App. is able to be downloaded on to a mobile device, such as a compatible mobile phone or tablet. Fishers will be provided with training on the use of this electronic reporting system. Although the Department will fund the initial development of the App., any modifications required to be undertaken to the system in the future will need to be funded by licence holders.

Further detail on the various reports is provided below and an overview provided in Table 4.

#### *Pre-fishing reporting*

Pre-fishing reports will need to be submitted at least 1 hour before the commencement of operations, as required under the current permits, and as required under numerous other fishery authorisations. This will require the report to be submitted via the App. 1 hour before leaving port.

#### *Catch and effort reporting*

Catch and effort reporting will be via the Smartphone App. The App. will replace paper-based logbooks and will minimise costs associated with data transcription, validation and management.

As fishers might fish more than one dive site per trip, catch and effort information will be reported for each dive site. At sea, effort will be manually entered by fishers using the App., which will also enable GPS location to be automatically captured and recorded by the phone. Recognising the difficulty of accurately weighing catch at sea and counting individual urchins, catch (by species) taken from each dive site will be measured and recorded at the place of landing and within 60 minutes of landing. This will require that urchins are stored in separate containers for each dive site.

As fishers might fish more than one dive site in a day, catch and effort will need to be recorded by site. It is very important to be able to separately collect the catch and effort information from these different locations because it will help to clearly define, monitor and manage the productive fishing grounds, including the future adjustment of TACC limits.

The catch information reported as part of the catch and effort report will be used to populate catch information which is used for quota balancing in the post-landing report. Where urchins have been processed at sea and landed as roe, the App. will automatically apply the relevant conversion rate.

#### *Pre-landing reporting*

Submission of a pre-landing report using the App. will be required 30 minutes prior to landing (consistent with the banded morwong fishery). As compliance risks will be mitigated significantly through the requirement to report 30 minutes prior to landing, allowance will be made to fish for other species (such as abalone, whelks and periwinkles) while fishing for sea urchin, provided all operators on the boat are licensed to fish for all targeted species. If a fisher is targeting sea urchins and would also like to fish for abalone on the same trip under an abalone licence, all current abalone regulations will apply to the fishing trip. For example, fishers may only fish one reef zone per trip and may only employ one diver per trip.

#### *Post-landing reporting*

Post landing reports will be required to be submitted at the place of landing and within 60 minutes of landing. These reports require net whole weight of urchin catch (by species) to be reported for the purposes of monitoring and managing the TACC, and for quota balancing. This catch information will be automatically captured from catch and effort reports.

<sup>2</sup> The validation of fishery-dependent catch and effort information will be critical to the standardised of catch rate, necessary for reviewing and adjusting TACCs in the future. It is the intention that depth information will be collected by the Department, through overlay of bathymetric data on the GPS information or other some other method which is yet to be determined.

Table 4 below provides an overview of the reporting requirements, including the data that is required to be reported at each stage of the reporting cycle and the timing of each report.

**Table 4. Overview of reporting requirements**

Report type	Data requirements	Timing
<b>Pre-fishing report</b>	<ul style="list-style-type: none"> <li>• Port of departure</li> <li>• Time of departure</li> <li>• Location of intended activity (area code)</li> <li>• Number of divers</li> <li>• Vessel registration</li> </ul>	1 hour prior to launch
<b>At sea (catch and effort) reporting</b>	<ul style="list-style-type: none"> <li>• Location (GPS coordinates)</li> <li>• Effort (dive time)</li> <li>• Catch (kg of roe and whole urchins, by species)</li> </ul>	GPS location and effort collected at each dive site; catch (kg) weighed and recorded at landing  Report to be submitted within 1 hour of landing
<b>Pre-landing report</b>	<ul style="list-style-type: none"> <li>• Place of arrival (port)</li> <li>• Estimated time of arrive and time of landing</li> <li>• Estimation of total catch</li> </ul>	30 mins prior to arrival
<b>Post-landing report</b>	<ul style="list-style-type: none"> <li>• Catch (whole net weight)</li> <li>• Time catch weighed</li> <li>• Time catch departed place of landing</li> </ul>	Within 1 hour of landing

The use of a remote vessel monitoring system (such as a VMS) will not be used initially but could be adopted in the future if industry believe the costs of implementation are adequately offset by the benefits of more efficient verification of catch, effort and spatial data.

#### *Catch disposal records*

Catch Disposal Records (CDRs) provide information on the landed commercial catch for the purpose of tracking of the flow of legal catch from the first point of sale and to verify information recorded electronically. CDRs protect the investment made by industry and ensure the integrity of the quota regime, and as such, are a key requirement of quota managed fisheries in Victoria.

The licence holder, or operator, will be required to complete a CDR to account for, and to accompany from the landing site, all urchins landed under the licence. The CDR will be required to be completed before urchins are sold or consigned. Where catch is split between two or more purchasers at the point of landing, a separate CDR will be required for each purchaser receiving urchin.

The sale of urchins beyond the point of landing will need to be accompanied by a 'sales receipt' to provide evidence that the urchins came from a legal source.

The Department will provide CDR books to the licence holder. Sale receipts will need to be issued in accordance with the Regulations.

## Quota

The Act provides for quota management in the form of ITQ units that are allocated or tied to fishery access licences. In the case of the abalone fishery only, quota units can be held as a stand-alone entitlement with no access licence required. Given the timeframes for implementation, the existing legislative framework will be utilised whereby ITQs are linked to non-transferable licences.

ITQs will represent the quantitative, transferable entitlement securing the right to harvest a proportion of TACC annually and in perpetuity. ITQs may be temporarily (leased) or permanently (sold) transferred to holders of the same licence class.

#### *Minimum quota holdings*

Minimum quota and ITQ unit holdings equivalent to 20 tonnes per licence will apply under the new arrangements. In effect, the application of minimum quota holdings will mean that a new access licence will not be issued or an existing one renewed at the start of the fishing year unless the applicant has ownership of at least 20 tonnes of quota. This will assist in managing the impacts associated with the proliferation of participants in the fishery and associated compliance costs, sustainability risks, compromised long term economic viability and competition between fishers.

Quota may either be sold or leased throughout the fishing year. However, the minimum quota holding will be required at the beginning of each fishing year or upon licence application in order to be to be authorised to fish.

Where there are sustainability concerns, there is the potential that the TACC may fall below the limits established at the commencement of the new arrangements. This creates the possibility that individual quota holdings may fall below the 20 tonne minimum quota holding requirement. In this instance, the minimum quota holding will be the quantum of quota units equivalent to the 20 tonne minimum at 2014 TACC levels (i.e. 200 quota units).

#### *Allocation of quota*

In order to transition those who have capital, equipment and experience invested in the fishery, each permit holder in the fishery at the time the fishery is gazetted will be granted an equal allocation of quota units.

Based on equal allocation of quota to permit holders, Table 5 below summarises the allocation results, both in terms of weight and number of quota units. Initially at the commencement of new management arrangements, the value of each quota will be set at 100 kg per unit. This will result in a number of quota units in the fishery and per licence holder that will support a market and trading in quota and meet the economic efficiency objectives for the fishery. The value of each unit will vary over time in response to adjustments to the TACC.

**Table 5. Summary of allocation based on recommended TACC setting approach**

	Allocation per licence holder (tonnes)	Number of quota units per licence holder <sup>1</sup>	Value per quota unit (kg)
<b>Black urchin (EZ)</b>	19	190	100
<b>White urchin (EZ)</b>	9.5	95	100
<b>White urchin (PPBZ)</b>	20	200	100

1. Number of quota units is based on initially setting the value of each quota unit at 100kg. This value may change proportionally over time in response to any TACC adjustments.

As outlined previously under TACC setting, the TACC for both the WZ and CZ will initially be set at zero and remain unallocated until a fishable biomass is proven to support opening of a fishery in these zones and the allocation of quota via competitive auction or tender mechanism.

#### *Provision for recreational and Aboriginal fishing*

Current participation by recreational and Aboriginal fishers in the fishery must be recognised in the allocation process. As no significant recreational or Aboriginal catch has been measured to date, catch will continue to be recognised and managed under existing legislation using output controls in the form of a daily bag limits. As information of increased catch becomes available and as part of the future allocation of the WZ and CZ, it may be appropriate to consider provision of explicit catch shares and opportunities for Recognised Traditional Owner (RTO) groups as outlined in Action 17 of the Aboriginal Fishing Strategy.

## Licences

In order to implement the new management arrangements based on Individual Quota Units (ITQs) without amendment to Victoria's current legislative framework, the creation of fishery access licences are necessary. Licences are required in order to attach quota units and to determine eligibility to participate in the fishery.

At the commencement of the new management arrangements, licences to operate in the PPBZ and EZ will be provided to the existing permit holders along with an equal allocation of quota units (ITQs). Any future licences to access the WZ and CZ will be granted to those who successfully acquire quota as part of the allocation process and meet the requisite eligibility requirements.

Licences will be subject to all provisions of the Act including:

- Will be issued to any entity (individual, single corporation or co-operative); and
- May be cancelled at if the Secretary considers that the person has ceased to be a fit and proper person to hold the licence, has ceased to satisfy any eligibility criteria/ and or has ceased to be actively, substantially and regulatory involved in the activities authorised by the licence.

Licences will also have the following characteristics:

- Application and renewal will be subject to fit and proper person eligibility and minimum quota holding requirements;
- Ability to engage up to three operators (who may also be divers) and crew, in addition to the licence holder, to carry out activities authorised by the licence;
- Will support fishing for other species on same trip (provided that all operators on the boat at the time of fishing are also authorised to fish for the other species and all Regulations can be complied with)
- Non-transferrable; and
- Limited licensing will not apply (i.e. there will be no cap on the total number of licences).

Licences may further specify any conditions that the Secretary deems appropriate.

Provision will be made for each licence holder to engage up to three additional persons to carry out activities authorised by the licence. Consistent with the requirements of section 39(2) of the Fisheries Act, all those conducting any activities authorised by the licence (which includes operators, divers and crew) will need to be listed on the licence and will need to pass fit and proper person standards. The allowance to list additional operators and crew will be subject to strict liability and the licence holder will be held jointly responsible for any offences committed by any person listed on the licence while they are carrying out activities under the licence. It is recommended that licence holders develop procedures to ensure responsibilities for operation of the licence are adequately assigned and liability relationships are clearly documented and agreed between parties. An additional extra provision may be to designate one operator as the 'responsible' supervisor. This person would be clearly identifiable and would be responsible for accurate reporting during fishing.

Given the mitigation of compliance risks through the proposed reporting and compliance framework, if the licence holder is separately authorised to take other species, sea urchin licences will also support fishing for other species on the same trip as fishing for sea urchin. It must be noted however, that when this occurs, sea urchin and other species may not be take on the same dive, and licence holders must ensure that all conditions for all species can be complied with. For example, as only one reef code may be fished at any one time when fishing for abalone, when fishing for sea urchin and abalone on the same trip, only one reef code may be fished.

## Gear

Commercial fishing for sea urchin will be by divers using underwater breathing apparatus. Only hand collection is allowed to avoid disturbance to fragile reef ecosystems and associated habitats during fishing activities.



## Sample cracking and processing at sea

The practice of sample cracking prior to harvest and removal of sea urchin roe in, on or next to Victorian waters is currently prohibited under Regulation 98 of Victoria's Fisheries Regulations 2009. However, in recognition of the legitimate need to be able to undertake these activities to select high quality and yield urchins and facilitate the extraction of roe, current permits expressly provide an exemption against Regulation 98 offences where activities are conducted in accordance with specific conditions. These conditions, which have been deemed necessary in order to ensure stock sustainability and the accuracy and robustness of catch data, include:

- Sample cracking of urchin prior to harvest in accordance with principles and practices set out within the endorsed Code of Practice; and
- Measuring and recording roe weight at the place of landing, using the appropriate roe to whole wet weight conversion factor.

### *Conversion factor to support processing at sea*

The processing of urchin at sea, which involves removal of roe and discarding of the outer shell, requires the use of an appropriate conversion for translating landed roe weight to whole wet weight at the point of landing to ensure the accuracy of catch data.

As roe yield and condition varies significantly between species and management zones subject to variations in environmental conditions and habitat, separate conversion factors are required for the different species for both zones. The conversion factors, developed in consultation with industry and validated by FRB through analysis of catch and effort returns, are outlined below in Table 6.

**Table 6. Conversion factors (%), per zone and species**

Species	Eastern Zone	Port Phillip Bay
<i>H. erythrogramma</i>	6%	9%
<i>C. rodgersii</i>	6%	N/A

These conversion factors will be retained under the future management arrangements and be reviewed on the basis of robust evidence which provides support for making any adjustments. As such, the ongoing analysis of catch and effort data for the purposes of monitoring and ground-truthing the conversion factor will be required, as lack of verification of catch data is a key risk to sustainable management of the sea urchin fishery (DEH, 2005).

The inability to verify species harvested potentially poses a key risk to the effective management and integrity of the TACC and administration of the QMS. Where there is evidence to suggest that this is a considerable risk to the fishery as a result of processing at sea, additional management controls may be introduced in the future to ensure that catch of different species can be verified. This may include use of sealed bins and tagging or other cost-effective mechanism.

## Compliance

The compliance regime for the fishery has been designed to respond to the cost-catch-risk profile of the fishery and to ensure that the key management objectives for the fishery are achieved.

The enforcement measures implemented for the fishery are scalable to the level of perceived risk. In addition to achieving deterrence through ongoing intelligence-led enforcement operations, a number of operating conditions are to be applied to the fishery to manage compliance risks, including, but not limited to:

- Any person operating on behalf of a licence holder must be named on the licence, will be required to pass fit and proper eligibility requirements and will be subject to strict liability;
- Application of minimum quota and ITQ unit holdings to prevent the proliferation of operators;
- Activity notification and reporting requirements;

- Requirements around landing of sea urchin (only at the place of landing or other designated location);
- Prohibition on transferring sea urchin at sea and between persons;
- No possession of recreationally caught sea urchins at the same premises as commercially caught sea urchins; and
- No recreational fishing from a commercially registered vessel.

## Fishery costs and cost recovery

Cost recovery is to apply for the sea urchin fishery and will be charged to the licence holder on a per quota unit holding basis for research and management, and per operator for compliance.

The licence holder will be subject to the recovery of costs for research, compliance, management and administration in accordance with cost recovery principles, including:

- Those who benefit from government services should pay for the associated costs; and
- The design, nature and extent of services should take account of the risks posed by the fishery and the value of production.

During the initial stages of transitioning to the new management arrangements, particularly given the marginal profitability of the fishery and modest cashflow while new market opportunities and productivity gains are being sought, management costs will be kept to a minimum. This will be ensured through setting a nominal TACC at a relatively conservative level in order to reduce the need for costly fishery-independent stock assessments, to manage the risks posed by the fishery and to ensure sustainability in data poor conditions.

The prospective system of cost recovery will require forecasting of the costs of management, including costs of research and compliance, and consultation with industry. The projected future management costs that result from this forecast will serve as the basis for determining licence levies and establishing the level of services requested from FEEB and FMS.

The estimated initial annual recoverable costs at the baseline level of management for the fishery (assuming use of a Smartphone reporting application) are expected to be in the order of \$24,188, consisting of:

- \$8,049 for research services;
- \$5,301 for compliance;
- \$8,832 for management; and
- \$2,006 for administration of catch and effort, quota and cost-recovery.

Levies will also be collected annually from licence holders to cover contributions to Seafood Industry Victoria (SIV) and the Fisheries Research and Development Corporation (FRDC).

In recognition of the fishery as an existing developing fishery, a phased in approach to the levies has been negotiated. The Sea Urchin Access Licence levies will therefore be phased in over 3 years, with 30% of the difference between current annual permit fees and the new cost recoverable service levies payable in the first year, 60% in the second, and 100% in the third year. As such, the following levies per licence will be payable:

- 2014-15 Levies per licence: \$1,255.07
- 2015-16 Levies per licence: \$1,868.99
- 2016-17 Levies per licence: \$2,687.56

Providing for the phased in payment of levies should assist industry in a phased in development of the fishery.

## Summary

Table 7: A summary of the management arrangements for the proposed Sea Urchin Fishery

Feature	Description
<b>Target species</b>	<ul style="list-style-type: none"> <li>White sea urchin (<i>Heliocidaris erythrogramma</i>)</li> <li>Black, long-spined sea urchin (<i>Centrostephanus rodgersii</i>)</li> </ul>
<b>Geographical context &amp; management zones</b>	<ul style="list-style-type: none"> <li>Waters adjacent to Victoria (State coastal waters only, with exclusions to apply)</li> <li>The commercial fishery will be managed spatially on the basis of four separate management zones: the Eastern Zone (EZ), Port Phillip Bay Zone (PPBZ), Central Zone (CZ) and Western Zone (WZ)</li> </ul>
<b>Total Allowable Commercial Catch (TACC)</b>	<ul style="list-style-type: none"> <li>The TACC will be set by individual management zone on the basis of available biomass on vegetated reef</li> <li>An initial TACC of 3% of biomass (114 tonnes) will apply to black urchin in the EZ. An initial TACC of 2% biomass will be set for white urchins in the PPBZ and in the EZ (equivalent to 60 tonnes and 57 tonnes respectively)</li> <li>TACC adjustments will be made in direct response to the level and type of data collection, and will be industry-led</li> </ul>
<b>Quota</b>	<ul style="list-style-type: none"> <li>The TACC will be managed by Quota Management System (QMS) and the allocation of Individual Transferable Quota (ITQ) units</li> <li>The application of minimum quota and/or ITQ unit holdings equivalent to 20 tonnes per licence will apply</li> </ul>
<b>Licensing</b>	<ul style="list-style-type: none"> <li>Licences are to be used as an administrative mechanism to link quota, for operator registration and for fit and proper eligibility assessments</li> <li>In addition to the licence holder, up to 3 operators (who may also be divers) and unlimited crew may be listed on the licence</li> <li>Licences will be non-transferable</li> <li>No cap on the total number of licences</li> </ul>
<b>Fishing year</b>	<ul style="list-style-type: none"> <li>From 1 July to 30 June</li> </ul>
<b>Reporting</b>	<ul style="list-style-type: none"> <li>Pre-launch, and pre and post-landing activity reporting to apply</li> <li>Catch and effort reporting at sea (effort and location recorded at sea, catch weighed and recorded once on land)</li> <li>Catch to be weighed and reported at the place of landing within 1 hour of landing</li> <li>All reporting (including activity reporting and catch and effort and reporting) to be supported by use of Smartphone reporting application</li> <li>Catch Disposal Records to be used</li> </ul>
<b>Processing</b>	<ul style="list-style-type: none"> <li>Authorisation to conduct sample cracking of urchin prior to harvest and the processing of urchin at sea</li> <li>Conversion factor to be applied to roe weight reported to support reporting of catch as whole wet weight</li> </ul>
<b>Fishery costs &amp; cost recovery</b>	<ul style="list-style-type: none"> <li>Cost recovery to apply for management, compliance and research</li> <li>The recoverable costs for the fishery during at commencement will be \$24,188, or \$2,687.56 per licence (of which \$1,225.07 will be payable by licence holders in the first year under a phasing in of levies).</li> </ul>

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# Appendix A: Data requirements for developing the fishery

The requirements for the collection, monitoring and assessment of data to support the development of the fishery are outlined below according to each level of development. Level 1 specifies the data requirements at the level of the baseline management arrangements. At Level 3, the data requirements are described for when the fishery is fully developed.

## **Level 1: Mandatory fishery-dependent data**

At the Level 1 baseline management arrangements, the only data that are collected are fishery dependent data mandated by reporting requirements set out in this document. This includes:

- Catch weight (urchins harvested, reported as whole wet weight and at a frequency of every hour/ before moving to a new fishing location – whichever is the sooner)
- Number of individual urchins harvested (to provide ongoing monitoring and ground-truthing of the conversion factor used to support processing of urchins at sea)
- Effort (bottom time)
- Number of divers
- Catch rate (calculated from Catch and Effort and spatial information collected from the Smartphone reporting application)
- Spatial distribution of effort and vessels hours at sea (from the Smartphone reporting application)
- Gear used (e.g. SCUBA, hookah or snorkel)

If the above mandatory fishery-dependent data are the only data collected, changes to the TACC will only be possible every 2 years (after the initial four year period with no changes upwards) and in response to standardised reef-based catch rates.

## **Level 2: Data collected at Level 1 plus fishery-independent survey data and additional (non-mandatory) data**

To progress beyond Level 1 baseline management arrangements and make positive adjustments to the TACC, fishery-independent surveys are conducted and additional data (non-mandatory) are collected. This is in addition to the ongoing collection of mandatory fishery-dependent data.

Fishery-independent surveys would typically include the following data:

- Density (number of urchins per square metre)
- Size structure of sampled urchins

These data would be combined with other data, such as size-to-weight relationships, size/age structure and fine-scale, reef-based spatial data to convert survey data into information that can be used to empirically set TACCs at the zonal level (providing scope for a larger adjustment to the TACC).

## **Level 3: Data collected at Levels 1 and 2 plus modelling to assess stock status**

At Level 3, the fishery is well developed with high quality data (fishery-dependent and independent data), a time-series of fishery information and a robust quantitative assessment. At this level, there is the least uncertainty regarding stock status and the yield from the fishery would be optimised. This level also represents the highest cost to the licence holder as it has high data collection and analysis requirements.

Modelling can be used to assess stock status, to determine management targets or limits, and to provide probabilities of desirable or undesirable outcomes of fishing given different management strategies.

Several models are also available to provide assessment advice for fisheries management, including surplus production and dynamic pool (e.g. yield per recruit) models and virtual production analyses. Information requirements, assumptions, advantages and disadvantages are itemised and discussed by Perry et al. (1999).

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