

# **NSW TOTAL ALLOWABLE FISHING COMMITTEE**

**SEA URCHIN AND TURBAN SHELL  
RESTRICTED FISHERY: RED SEA URCHIN**

**DETERMINATION FOR THE 2021 FISHING  
PERIOD**

13 November 2020

## Executive Summary

### Preamble

The New South Wales (NSW) Total Allowable Fishing Committee (TAFC) has statutory responsibilities set out in Part 2A of the *Fisheries Management Act 1994* (the Act) to determine the Total Allowable Commercial Catch (TACC) or Total Allowable Commercial Effort (TACE) by NSW fishers holding the relevant endorsement in some commercial fisheries. Various fishing regulations under the Act also contain provisions requiring the making of fishery determinations.

The TAFC is an independent statutory body established under Schedule 2 of the Act. In making a determination on catch or effort in a commercial fishery, the TAFC must consider the ecological, economic and social issues associated with each fishery and make determinations that 'on balance' pursue the objectives of the Act.

The TAFC is not subject to the control or direction of the Minister as to any determination made. However, the Minister may direct the TAFC on the procedures to be followed and the matters to be taken into account in making a fishing determination.

This determination is for the Sea Urchin and Turban Shell (SUTS) Restricted Fishery for the period 1 January to 31 December 2021. The Red Urchin (RU) fishery is a significant part of the SUTS multi-species restricted fishery that is managed by a combination of input controls (e.g. minimum size limits) and individual quotas for red urchin. A TACC and equal individual transferable quotas (ITQs) are only applied to red urchins. There are 37 SUTS holders in the fishery and each endorsement has received an annual quota allocation of 1,622 kg for red urchin under a TACC of 60 tonnes since 2002. The red urchin ITQ cannot be separated from the SUTS endorsement and ownership cannot be permanently transferred amongst endorsed fishers, but the quota can be leased within a fishing period. Concerns at reduction of individual quota allocations for active divers if the TACC is reduced, coupled with hindrances at leasing quota, has prevented the TACC from being revised since it was first implemented in 2002. Due to economic and social considerations with the temporary transfer of quota within a fishing period, the TAFC supports the setting of Regional Catch Limits (RCLs) across five (5) regions to ensure those fishers that specifically target red urchins can continue to effectively operate in the fishery (Appendix 1). Regional Catch Limits also provide some protection against overfishing and serial and/or localised depletion in fished areas.

Regions 3 and 4 have contributed over 60% of the total catch in recent years. In both regions, historical and recent peaks in fishing effort and catch have been followed by rapid and substantial declines in catch rate. A similar pattern was historically seen in Region 2, with periods of increased catch being followed by rapid declines in catch rate. These declines in catch rate indicate that the stock is subject to serial localised depletion, even at the relatively low catch levels reported in recent years. RU fishers at the TAFC public meeting agreed that the fishery had seen localised serial depletions in some fished areas and declines in catch rates at various scales.

Declines in catch per unit of effort (CPUE), which is an index of abundance, need to be arrested if the fishery is to remain economically viable. However, there are no major biological concerns with the resource, due to the protection of spawning adults in closed areas across NSW and implementation of the minimum size limit (MSL) in late 2019.

## Management recommendations & supporting actions

The TAFC provides the following research recommendations to the Minister, NSW Fisheries and the SUTS fishing industry towards improving the management of the fishery:

1. Collection of representative size-frequency distribution information for Red Urchins in fished areas. This could be done cost-effectively by developing a cooperative research project whereby all industry divers provide urchin diameter measurements for the first 50 urchins randomly selected on an agreed number of dives. Data collection should be spread across fished areas to the extent possible under current diving patterns. These size data will inform a realistic understanding of the urchin population structure in the fished areas and how it changes as a result of fishing.
2. Investigate cost-effective options for obtaining snapshots of Red Urchin density and size-frequency distribution in closed areas, to confirm the degree to which these closed areas are supporting healthy populations of urchins that can potentially provide spawning and recruitment to re-populate adjacent fished areas.

The TAFC also supports the collection of socio-economic data to enable improved assessment of the economic performance of the RU Fishery and the rollout of data loggers in the fishery to gather fine scale data on fishing effort.

## Determination

The Total Allowable Fishing Committee, pursuant to Part 2A of the *Fisheries Management Act 1994*, determines that the commercial catch of Red Urchins in the NSW Sea Urchin and Turban Shell restricted fishery should be controlled and allocated through two separate, but dependent measures:

1. A TACC for red urchin during the period 1 January to 31 December 2021 of **60 tonnes**; and
2. Regional Catch Limits across the specified five (5) regional zones that collectively should not exceed **19.0 tonnes** as follows:

Region	Catch Limit 2021 (tonnes)
1	2.35
2	4.90
3	6.13
4	5.62
5	0
<b>Total</b>	<b>19.0</b>

## Introduction

The commercial harvest of Red Urchins (RU) in NSW is managed as part of the Sea Urchin and Turban Shell (SUTS) Restricted Fishery. The SUTS fishery is a declared restricted fishery under Division 1 of Part 9 of the *Fisheries Management (General) Regulations 2019*, pursuant to Section 111 of the *Fisheries Management Act (NSW) 1994*. The fishery for RU is managed through a combination of input (minimum size limit; spatial closures) and output controls (quota; regional catch limits).

The commercial RU fishery commenced in 1999 with an initial peak harvest of 85.5 tonnes in 2000. Early concerns about overfishing resulted in a total allowable commercial catch (TACC) being established in 2002 at 60 tonnes. Commercial harvest has remained well below this 60 tonne TACC since 2002, however, as a small number of fishers target RU in the SUTS fishery, this TACC has continued to be equally allocated between the 37 endorsement holders in the SUTS fishery.

To further restrict high levels of fishing effort and serial depletion, Regional Catch Limits (RCLs) were introduced into the fishery in 2001. The commercial catch has never reached the combined Regional Catch Limits or the TACC and this is of ongoing concern for the fishery management, based on evidence of declining catch rates.

## Biological considerations

Large urchin species such as Red Urchin (*Heliocidaris tuberculata*) are slow growing, with low biological productivity and slow replacement rates. Growth studies have not been conducted specifically for red urchin, but the growth of the co-occurring Purple Urchin (*Centrostephanus rodgersii*)<sup>1</sup> and Green Urchin (*Heliocidaris erythrogramma*)<sup>2</sup> have been investigated. These species have been found to attain over 25 years of age at sizes of 100-125mm test diameter. With its thicker test and spines, Red Urchin may grow even more slowly. Red Urchins are reported to mature around 55-60 mm diameter<sup>3</sup>, which would be around five years of age at the above growth rates. The consequence of this slow growth and low replacement rates is that areas depleted by fishing may take decades to repopulate, particularly with larger, older commercially valuable urchins.

## Status of the stock

Details of the most recent stock assessment and status for the New South Wales Red Urchin (RU) stock are provided in the *Stock assessment report 2020 – Sea*

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<sup>1</sup> Pecorino et al. (2012) Growth, morphometrics and size structure of the Diadematae sea urchin *Centrostephanus rodgersii* in northern New Zealand. *Marine and Freshwater Research*, <http://dx.doi.org/10.1071/MF12040>

<sup>2</sup> Pederson H and C Johnson (2008) Growth and age structure of sea urchins (*Heliocidaris erythrogramma*) in complex barrens and native macroalgal beds in eastern Tasmania. *ICES Journal of Marine Science*, 65: 1–11.

<sup>3</sup> Laegdsgaard P, M Byrne, DT Anderson. 1991. Reproduction of sympatric populations of *Heliocidaris erythrogramma* and *H. tuberculata* (Echinoidea) in New South Wales. *Marine Biology* 110, 359–374.

*Urchin and Turban Shell Fishery*<sup>4</sup>. Information and conclusions regarding status of the stock in fished areas have not changed substantively since the previous determination report<sup>5</sup> and the observations regarding stock status in that report remain valid.

The RU stock is selectively fished by divers who can select larger urchins of a size required by the market. Small urchins are of little value in the market and so are not fished. A proportion of the urchin stock is also protected in closed areas, with fishing impacts occurring in open areas. The status of the stock therefore needs to be considered from two different perspectives:

- What is the overall biological status of the stock and is the overall stock depleted to the extent that there is a risk of recruitment impairment that could result in stock collapse?
- What is the status of the fishable portion of the stock and is the status of the fishable resource adequate and appropriately managed to ensure a viable fishery into the future?

### **Biological stock status**

The RU population was independently surveyed by Worthington and Blount<sup>6</sup> in early 2000, providing the first and only fishery-independent estimate of the biomass of the stock along the NSW coast at that time. Based on the results of that survey, it was concluded that about one third of the stock occurred in closed areas, protected from commercial fishing. In 2019, a minimum size limit (MSL) was introduced in the fished areas, initially at 115 mm and subsequently reduced to 95 mm. Based on the understanding of urchin growth (and Purple Urchins) in these areas, this MSL may protect RU up to about 10 years of age.

The combination of the closed areas and the minimum size limit protects an adequate proportion of adult RU spawning potential to ensure ongoing successful recruitment and prevent overfishing of the overall biological stock. The overall status of the biological stock can be considered to be **Sustainable**, provided the closed areas continue to protect about one third of the population and the MSL continues to protect spawning adults for a number of years before they recruit to the fishery.

There are, however, questions about the population within closed areas, given that these areas have not been re-surveyed since 2000. In particular, the effects of changing environmental conditions, such as the strengthening southern extension of

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<sup>4</sup> Chick, R.C. 2020. Stock assessment report 2020 – Sea Urchin and Turban Shell Fishery – Red Sea Urchin (*Heliocidaris tuberculata*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute: 53 pp.

<sup>5</sup> NSW Total Allowable Fishing Committee (2019) Report and Determination for the 2020 Fishing Period. Sea Urchin and Turban Shell Restricted Fishery: Red Sea Urchin.

<sup>6</sup> D.G. Worthington DG and C Blount, 2003. *Research to develop and manage the sea urchin fisheries of NSW and eastern Victoria*. FRDC Project No. 1999/128. NSW Fisheries Final Report Series No. 56. ISSN 1440-3544

the warm East Australian Current, increase in water temperatures and increasing intensity of subtropical cyclonic storms, are not known.

Fishery independent surveys are unaffordable for this low value fishery, but it would be valuable to try and obtain some information that might confirm whether there are still substantial numbers of urchins protected in closed areas.

### ***Status of the fished resource***

Since the start of targeted RU fishing in 2000 and the establishment of five fishing zones (see Appendix 1), the fishery has been characterized by periods of focussed fishing in a particular area for a few years, followed by a shift in fishing effort to another area. Fishing focussed on Region 3 in 2000 – 2001, on Region 2 from 2002 – 2013 and has since shifted back into Region 3 and Region 4.

In recent years, Regions 3 and 4 have contributed over 60% of the total catch. In both regions, historical and recent peaks in fishing effort and catch have been followed by rapid and substantial declines in catch rate. A similar pattern was historically seen in Region 2, with periods of increased catch being followed by rapid declines in catch rate. These declines in catch rate indicate that the stock is subject to serial localised depletion, even at the relatively low catch levels seen in recent years.

Total RU catch has remained substantially less than the TACC of 60 tonnes since it was implemented, being less than 20 tonnes since 2001. Annual catches averaged 18.6 t/year over 2016 - 2019 and only 6.2 t/year over 2010 - 2015. Regional Catch Limits (RCLs) recommended by the previous TAF Committee for 2019 were only reached in Region 3 and were substantially under-caught in the other regions open to commercial fishing.

Within these RCLs, catches have usually been taken in relatively few small subzones, indicating that serial localised depletion occurs at a fine spatial scale, with fishing effort being sequentially focussed on urchin aggregations in relatively small areas. Anecdotal information provided by divers who have operated in this fishery for a long time confirms that density of urchins has been rapidly depleted in heavily fished areas and that significant recovery of these areas has not been observed on return fishing trips.

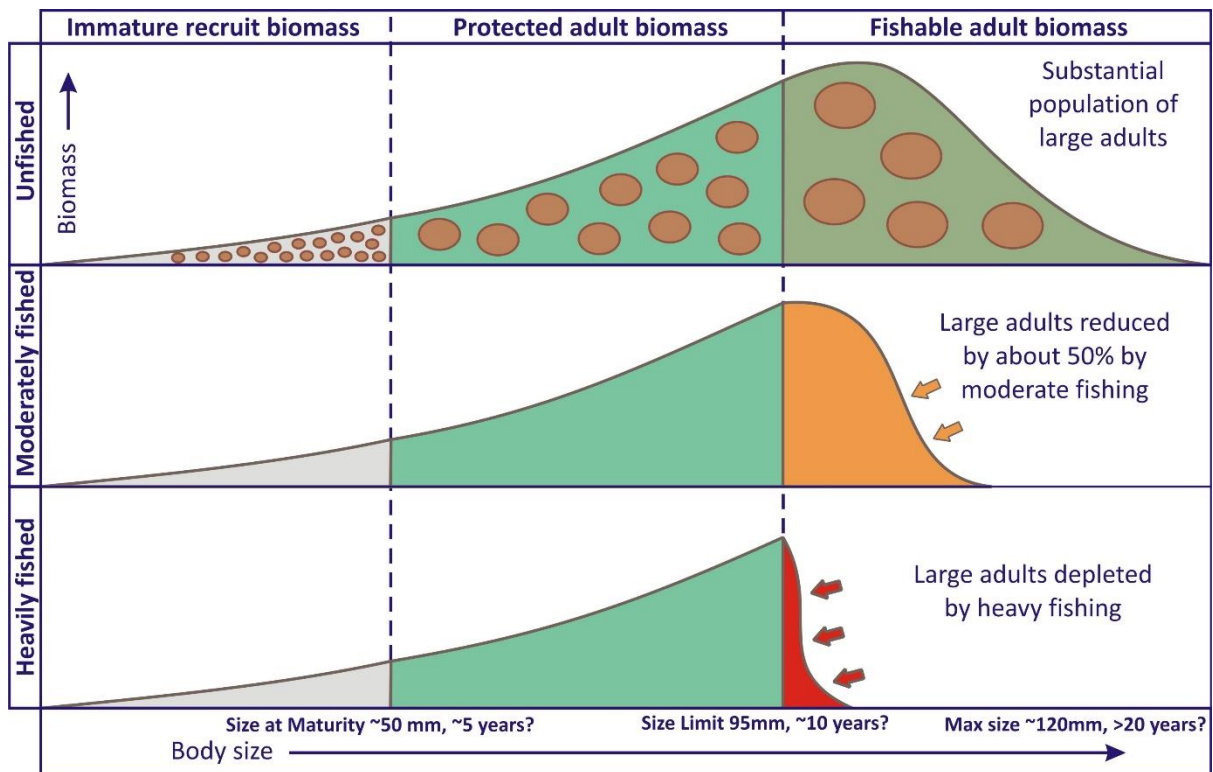
These results indicate that fishing mortality has exceeded sustainable levels in fished areas over the past 3-5 years and continues to do so. The overall biomass of RU available in the fished areas appears to be declining at recent levels of catch and is particularly showing depletion in small, heavily fished areas. This evidence of ongoing serial depletion supports action to reduce the TACC. However, there is no quantitative survey or stock assessment information available from which to confidently recommend a long-term sustainable level of catch.

## Population Structure

The diagram below illustrates the likely structure of a sea urchin population under conditions of no fishing, moderate fishing and heavy fishing. Explanation of the key characteristics of the stock under these conditions are provided in the table below.

The Committee is concerned that some of the fished areas are depleting as depicted below, given the reported CPUE declines that have followed peaks in fishing intensity in several fished areas and the observations of RU fishers.

One of the most pressing information needs for the RU population is the size-frequency distribution of urchins in both fished and unfished areas, to better understand which of the diagrams below may best apply to RU. Use of automated data loggers by divers, as used in the abalone dive fishery, is encouraged to collect the accurate catch and effort data required to track changes in CPUE at a fine spatial scale.



<b>Unfished</b>	<p><b>This is the situation expected to exist in the closed areas: large adult population, good spawning and spill-over recruitment to fished areas</b></p>
	<p><u>Stock Status</u>: Variable numbers of small, immature urchins, depending on recruitment success.</p> <p>Moderate to high numbers of medium sized adults protected by minimum size limit should ensure that 20 - 30% of the spawning potential is protected.</p> <p>Numerous large adults above the size limit would produce much of the spawning.</p>
<b>Moderately fished</b>	<p><b>This is the situation to aim for in fished areas: a reasonable sized fishable population with an effective MSL and a viable fishery</b></p>
	<p><u>Stock Status</u>: Enough mature urchins protected by the minimum size limit and spatial closures to provide recruitment and ensure the stock remains sustainable.</p> <p>There will still be young recruits settling on reefs, although recruitment may be reduced.</p> <p><u>Fishery</u>: Fishable biomass reduced by 50% or more. Catch rates reduced to ~30 – 50 kg/hr but income still exceeds operating costs. Fishery remains profitable.</p>
<b>Heavily fished</b>	<p><b>This is a situation to be avoided: few large adults, catch rates have declined to low levels and a fishery is no longer commercially viable</b></p>
	<p><u>Stock Status</u>: Enough mature urchins protected by the minimum size limit and spatial closures to provide recruitment and ensure the stock remains sustainable.</p> <p>There should still be young recruits settling on reefs, although recruitment will be reduced.</p> <p><u>Fishery</u>: Catch rates low &lt; 30kg/hr, operating costs exceed income, fishery not profitable. Fishable biomass reduced by 75% or more. Few urchins left above the minimum size limit.</p>

### Research priorities

To improve understanding of Red Urchin stock status and fishery viability, it is recommended that medium-term research and data collection efforts be focussed on the following priorities:

- Collection of representative size-frequency distribution information for Red Urchins in fished areas. This could be done cost-effectively by developing a cooperative research project whereby all industry divers provide urchin



diameter measurements for the first 50 urchins randomly selected on an agreed number of dives. Data collection should be spread across fished areas to the extent possible under current diving patterns. These size data will inform a realistic understanding of the urchin population structure in the fished areas and how it changes as a result of fishing.

- Investigate cost-effective options for obtaining snapshots of Red Urchin density and size-frequency distribution in closed areas, to confirm the degree to which these closed areas are supporting healthy populations of urchins that can potentially provide spawning and recruitment to re-populate adjacent fished areas.

## Economic considerations

Details of the economic characteristics of the fishery, namely catch, price, gross value of production (GVP), quota transfers and management charges, are provided in the most recent *Management Report 2020 – Red Sea Urchin and Turban Shell Fishery*<sup>7</sup>. Information on factors directly affecting the economic performance of the fishery, namely catch, effort, catch rate and number of active fishers, is provided in *Stock Report 2020 – Red Sea Urchin and Turban Shell Fishery*<sup>8</sup>.

To provide a sense of the trends in these various indicators, a summary of the available data is provided in Table 1. Price and GVP data for the years prior to 2007 are not available and some doubt was raised at the 27 October 2020 public meeting about the completeness of reported catch and effort data prior to 2007. For these reasons, summary data are reported in Table 1 for the period 2007 to 2019 only, aggregated into three time periods: Period I (2007-2010), Period II (2011-2015) and Period III (2016-2019)<sup>9</sup>.

**Table1:** Summary economic data in the red sea urchin fishery, 2007-2019

Period	Years	Catch (t)	Effort (hr)	No. active fishers (RU)	CPUE (kg/hr)	Price (real \$/kg)	GVP (real \$'000)
I	2007 - 2010	11	187	9	60	\$4.17	47
II	2011 - 2015	6	152	9	41	\$5.19	32
<i>I &amp; II</i>	<i>2007 - 2015</i>	<i>8</i>	<i>168</i>	<i>9</i>	<i>50</i>	<i>\$4.59</i>	<i>39</i>
III	2016 - 2019	19	622	14	30	\$8.86	165

Source: Appendix 2

<sup>7</sup> Giles, N. and Roswell, M. 2020. Management Report 2020 – NSW Red Urchin Fishery. Report to the TAC Committee for the 2020 fishing period. NSW Department of Primary Industries, Fisheries NSW, Coffs Harbour, 26 pp.

<sup>8</sup> Chick, R.C. 2020. Stock assessment report 2020 – Sea Urchin and Turban Shell Fishery – Red Sea Urchin (*Heliocidaris tuberculata*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute: 53 pp.

<sup>9</sup> Data for 2020 has not been reported due to incompleteness and the impact of COVID-19.

Dividing those 13 years into three multi-year periods captures the essence of the trends and known economic characteristics of the fishery<sup>10</sup>. Trends in key indicators are as follows:

*Catch:*

- Annual average catches almost halved from Period I to II, falling from 11 to 6 tonnes per annum (p.a).
- In the four years to 2019 (Period III), annual catch averaged almost 19 tonnes, a three-fold increase over Period II.

*Price:*

- There was a modest increase in real price from Period I to II, rising from \$4.17/kg to \$5.19/kg.
- Price increased sharply in period III, to an average of \$8.86/kg. In 2019, price was at its highest over the 13-year period, averaging \$10.88/kg across that year.

*GVP:*

- Reflecting the above trends in catch and price, average annual GVP experienced a moderate fall from Period I to II (\$47,000 to \$32,000).
- GVP increased significantly in Period III, averaging \$165,000 p.a. Real GVP in 2019 (\$191,000) was the highest recorded over the 13 years 2007 to 2019.

*Effort:*

- Despite a modest increase in price, average annual effort fell slightly from Period I to II, dropping from 187 hrs to 158 hrs. The number of active fishers was steady across Periods I and II, averaging 9 p.a.
- Reflecting the steep increase in price, effort increased significantly in Period III averaging 622 hrs p.a, a three-fold increase over period II. The average number of active fishers also increased substantially between Periods II and III, from 9 to 14 p.a.

*Catch Rate:*

- Catch per unit effort (CPUE) fell by almost one-third between period I (60 kg/hr) and II (41 kg/hr).
- The trend continued between Periods II and III with CPUE falling by more than one-quarter, from 41 kg/hr to 30 kg/hr.

## **Analysis**

As noted in the previous determination report<sup>11</sup> there are no independent economic targets or performance indicators for the fishery. Unfortunately, no information is available on the cost of fishing, which would allow analysis of the economic position

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<sup>10</sup> A complete annual data set is provided in Appendix 2.

<sup>11</sup> NSW Total Allowable Fishing Committee (2019) Report and Determination for the 2020 Fishing Period. Sea Urchin and Turban Shell Restricted Fishery: Red Sea Urchin.

of the fishery. Data on the variable costs of fishing would, at least, enable the estimation of a gross margin for the active business units and the fishery as a whole. A fishery gross margin model can be an alternative or proxy to maximising fishery profit as measured by maximum economic yield (MEY)<sup>12</sup>. A fishery gross margin can be calculated as total fishery income less total variable costs, where variable costs are proportionate to fishing effort.

While variable cost data for RU harvesting are not available, some inferences about fishing profitability over the 2007 to 2019 period can be made on the basis of the observed trends in other economic-related data as discussed above, assuming that the variable costs of fishing have remained relatively constant in real terms (i.e. after accounting for inflation).

An informal analysis of the financial performance of approximately 25 commercial fisheries for the 2019 financial year, fisheries for which data have been collected and compiled in a consistent way, was undertaken to develop a simple set of guidelines (rules of thumb) to indicate fishery profitability in terms of fishery gross margin calculations. The indicator used was gross margin as a percentage of total revenue and its relationship to return on total boat capital (ROTBC, i.e. profit at full equity divided by total boat capital). The general findings were:

- “High” profit (ROTBC>5%) fisheries generally had a boat gross margin in the range 50-65%
- “Moderate” profit (1%<ROTBC<5%) fisheries generally had a boat gross margin in the range 35-50%
- “Unprofitable” (ROTBC<1%) fisheries generally had a boat gross margin of less than 35%

In a multi-species fishery, like SUTS, where fishers can and do target other species in the fishery as well as operate in other fisheries, it can be worthwhile fishing even when the gross margin is relatively low. This can be the case, for example, where fishing is seasonal (nothing else to target at the time so the opportunity cost of labour is low), or if the fisher happens to be in the right area at the right time (low travel costs), or the fisher is trying to fill an order to maintain a relationship with a buyer.

Keeping in mind that there are many factors that can affect fisher behaviour, it is possible to demonstrate how profitability thresholds (high, moderate and unprofitable) will change under different combinations of CPUE and price, two key factors in calculating profitability. As noted above, the variable cost of fishing (per hour) is unknown but, assuming it has remained relatively constant in real terms, the sensitivity of profitability to CPUE and price can be demonstrated (Table 2).

In Table 2, fishery gross margin as a percentage of GVP is reported for a range of CPUE values (from 20kg/hr to 60 kg/hr) and prices (\$7.19/kg, the lowest average annual price in Period III; \$8.88/kg the whole of Period III average and \$10.88/kg, the

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<sup>12</sup> MEY indicates the level of catch that provides the maximum net economic benefits or profits to society. MEY can be estimated using complex bio-economic models with key parameters including biological carrying capacity (biomass at no fishing), biomass growth rate, fishing mortality rate, revenue and costs.

highest average annual price in Period III, which is probably close to a ceiling price due to urchin species substitution).

**Table2:** Sensitivity of profitability<sup>a</sup> to catch rates and price.

CPUE (kg/hr)	Price (\$/kg)		
	\$7.19	\$8.86	\$10.88
20	-22%	1%	19%
25	2%	21%	35%
30	19%	34%	46%
35	30%	43%	54%
40	39%	50%	60%
45	46%	56%	64%
50	51%	60%	68%
55	56%	64%	71%
60	59%	67%	73%

<sup>a</sup> Calculated as a fishery gross margin divided by fishery GVP expressed as a percentage. Assumes a variable cost of fishing of \$175/hr.

The results have been colour-coded to show:

“High” profit – green: GM>50%

“Moderate” profit – blue: 35%<GM<50%

“Unprofitable” – brown: GM<35%

## Implications

While there is uncertainty around the cost of fishing, the following general comments can be made:

- There is likely to be high profitability if CPUE > 50, even at lower prices (e.g. \$7.19/kg).
- There is likely to be moderate profitability if 30<CPUE<50, although this is highly sensitive to product price and cost of fishing.

The fishery is unlikely to be profitable if CPUE < 30, unless a sustained, higher price similar to the 2019 average (\$10.88/kg) is achieved.

It is noted that in 2019 the NSW Government commissioned Professor Kate Barclay to undertake an independent assessment of the socio-economic impacts of the NSW commercial fisheries Business Adjustment Program (BAP)<sup>13</sup>. One of the key recommendations of the report was to establish a social and economic monitoring framework for NSW commercial fisheries as a matter of high priority and urgency. The government has supported this recommendation and DPI has initiated the process to establish independent and ongoing social and economic indicator monitoring for NSW’s commercial fisheries<sup>14</sup>.

<sup>13</sup> Barclay, K (2020), Economic analysis & Social and Economic monitoring following the NSW Commercial Fisheries Business Adjustment Program, report to NSW Department of Primary Industries.

<sup>14</sup> [https://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0011/1256393/Govt-reposnse-Economic-analysis-and-social-and-economic-monitoring-following-the-NSW-Commercial-Fisheries-Business-Adjustment-Program.pdf](https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0011/1256393/Govt-reposnse-Economic-analysis-and-social-and-economic-monitoring-following-the-NSW-Commercial-Fisheries-Business-Adjustment-Program.pdf)

It is desirable that the proposed collection and monitoring of social and economic data is undertaken at a level of disaggregation that is useful for the economic analysis of small quota fisheries such as RU. This would enable development and monitoring of economic targets and performance indicators for the fishery.

### Fishery Management considerations

Red Urchin (RU) is a key part (~ \$200,000 GVP) of the Sea Urchin and Turban Shell (SUTS) Fishery (~ \$350,000 GVP). There are several SUTS focussed fishing businesses with up to 12 of the 37 SUTS Restricted Fishery licence owners harvesting RU in any one season. SUTS fishery cost recovery exceeds 10% of the fishery GVP, which is high in comparison to many other NSW fisheries. Management considerations as part of this determination for RU are therefore focussed on keeping additional fishery costs to a minimum, while addressing key stock and fishery priorities. Given this, the only significant management change recommended is to reduce the Regional Catch Limits for the 2021 season from a combined total of 22.5 tonnes to 19.0 tonnes, with the reduction split proportionally across the five RU regions (see table below). The RU Total Allowable Commercial Catch (TACC) remains at 60 tonnes.

<b>Region</b>	<b>2020 Catch Limit (t)</b>	<b>2021 Catch Limit (t)</b>
1	2.80	<b>2.35</b>
2	5.80	<b>4.90</b>
3	7.25	<b>6.13</b>
4	6.65	<b>5.62</b>
5	0	<b>0</b>
<b>TOTAL</b>	22.5	<b>19.0</b>

The 2020 NSW Department of Primary Industries (the Department) stock assessment is that the RU stock is biologically sustainable, but is depleting in areas open to commercial fishing. The TAFC accepts this assessment and noted that this meant the economic performance of the fishery was likely declining based on reliable catch per unit of effort (CPUE) data from 2007 to 2020. However, the level of stock depletion is unknown and difficult to quantify with the available fishery information. In addition, the effectiveness of the recently introduced 95mm minimum size limit (MSL) in 2019 in protecting some of the spawning adults is not yet known. Gaining a better understanding of the level of stock depletion in the areas open to commercial fishing and the effectiveness of the MSL are regarded by the TAFC as priorities and form the basis of its two recommendations. These matters are considered in depth in the scientific section of this determination.

Implementing the two recommendations will require a partnership between the Department and industry to ensure it is cost effective and delivers the information the TAFC needs to make future decisions about sustainable catch levels. The TAFC recognises gathering the required data, analysis and reporting will take several years and so is intending that, in the absence of any compelling new information and subject to further industry consultation in 2021, the 60 tonne TACC and 19 tonne

combined regional catch limit for RU should remain at the same level for the next three seasons (2021 to 2023).

At the 28 October 2020 meeting between the TAFC, Department and industry it was generally acknowledged that the catch rates in the fishery were in decline and the combined Regional Catch Limits of 22.5 tonnes was not constraining catch and was not sustainable. This view was based on the Department's 2020 RU/SUTS stock assessment and management report, supported by the comments made by many industry participants present at the consultation meeting. However, there is no information on which to determine a sustainable catch level, noting that combined regional catches had not exceeded 20 tonnes in any season in the past 15 years. In considering any catch reduction, the TAFC also took account of the need to prove the effectiveness of the 95mm MSL introduced in 2019 and having industry continue to fish RU to gather the data required to address the two TAFC recommendations.

In response to these circumstances and economic considerations, the TAFC's decision is to reduce the combined regional RU catch limit from 22.5 tonnes to 19.0 tonnes. This latter amount reflects the average of the last four years reported combined regional catches. Constraining total catch to its current level is a means of limiting the economic risk, while information on which to base a future sustainable catch level is collected. It also enables RU fishers to continue their operations at recent catch levels, provided latent effort (non-active licences) is not activated.

The reduction in the combined regional RU catch limit is being implemented on a proportional basis across the five regions, with the TAFC aware that the regional catch limit in region three had been overcaught in each of the past two seasons (2019 and 2020) and this may occur again in one or more regions in 2021. Predicting whether a Regional Catch Limit would be overcaught is not straightforward, given the interaction between market price, seasonal business arrangements, catch rates and significant latent effort in the SUTS Fishery. While these matters are considered in depth in the economic section of this determination, the Department is encouraged to make the necessary preparations to close a region in a manner that minimises any risk of the catch exceeding the regional catch limit.

Based on the available evidence, this level of catch poses no significant risk to the biological sustainability of the resource. The latter being well served by having about 30% of the area of the fishery closed to commercial fishing and (subject to verification) an effective MSL.

Some industry members proposed that rotational fishing be considered that would see some fishing in currently closed areas, while other (currently open) areas of the fishery were less intensively fished. The aim would be to spread the catch over a greater area and improve stock recovery in historically fished areas. The TAFC considered this proposal carefully, but concluded it was a high-risk approach, when there is no current basis on which to determine a sustainable catch for RU and recovery rates for similar sea urchin species are known to take many years (possibly decades). Opening closed areas could also undermine the biologically sustainable status of the fishery, with any catch limit set effectively becoming guesswork.

Following its decisions regarding the Regional Catch Limits, the TAFC revisited the 60 tonne TACC for RU and in doing so noted the 2020 determination report. While the TAFC accepted the argument for keeping the TACC at 60 tonnes to enable licence owners and nominated fishers to work within the restricted fishery framework, it did not see any urgency to introduce permanent transferability of RU quota, as part of any move to a share managed fishery. This was on the basis that a greater understanding of the sustainable catch from the fishery was required first, given the significant set-up and on-going costs of making RU a share managed fishery.

The report and determination for 2020 also considered other (non-commercial) sources of fishing mortality from the recreational and customary fishing sectors and any illegal fishing. The Department's compliance advice was that these catches may amount to no more than five tonnes per annum. While the TAFC accepts this is the best information available, it noted the low level of certainty on which it was based.

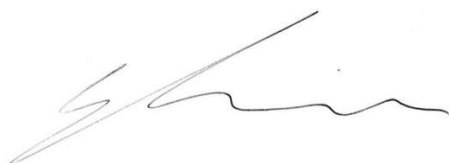
## Determination

The Total Allowable Fishing Committee, pursuant to Part 2A of the *Fisheries Management Act 1994*, determines that the commercial catch of red urchins in the NSW SUTS restricted fishery should be controlled and allocated through two separate but dependent measures:

1. A TACC for red urchin during the period 1 January 2021 to 31 December 2021 of **60 tonnes**; and
2. Regional Catch Limits across the specified five (5) regional zones that collectively should not exceed **19.0 tonnes** as follows:

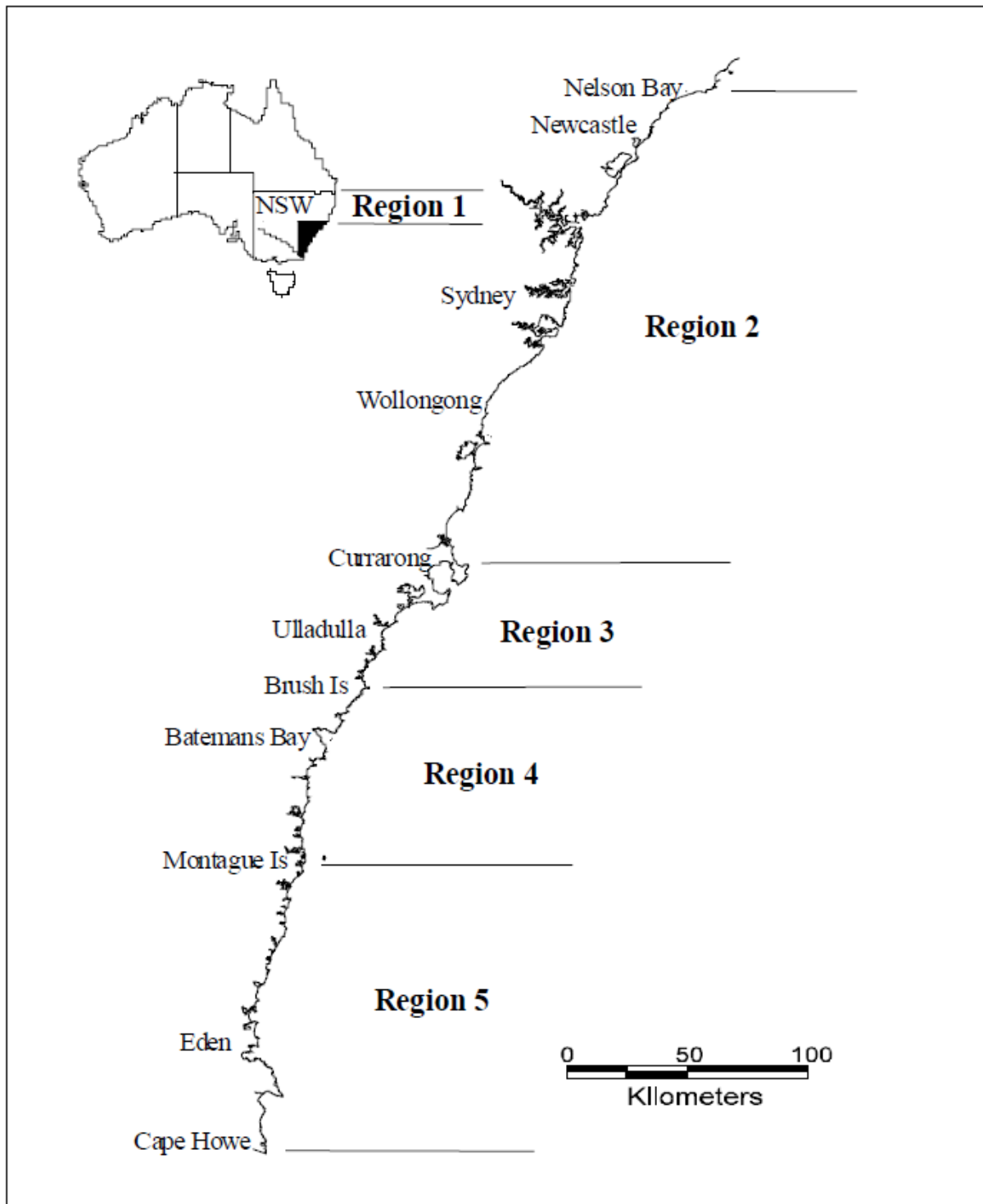
Region	Catch Limit 2021 (tonnes)
1	2.35
2	4.90
3	6.13
4	5.62
5	0
<b>Total</b>	<b>19.0</b>

Signed (for and on behalf of the TAFC)



William Zacharin  
Chair, TAFC

**Appendix 1: Regions in the Red Urchin commercial fishery**





## Appendix 2: Summary economic data in the Red Urchin fishery, 2000-2019

Year	Catch (t)	Effort (hr)	No. active fishers (RU)	CPUE (kg/hr)	Price (real \$/kg)	GVP (real \$'000)
2000	85.5	861	10	99.3		
2001	49.7	774	13	64.2		
2002	11.7	282	6	41.5		
2003	10.8	427	9	25.3		
2004	5.4	207	11	26.1		
2005	5.9	217	14	27.2		
2006	5.3	217	14	24.4		
2007	17.5	194	8	90.2	4.05	70.9
2008	12.9	185	8	69.7	4.33	55.8
2009	8.5	217	12	39.2	3.72	31.6
2010	5.9	153	9	38.6	4.86	28.7
2011	6.6	141	9	46.8	4.39	29.0
2012	6.7	142	8	47.2	4.64	31.1
2013	5.5	165	9	33.3	4.55	25.0
2014	4.7	130	8	36.2	4.04	19.0
2015	7.5	184	9	40.8	7.59	56.9
2016	18.1	564	11	32.1	8.00	144.8
2017	19	667	16	28.5	7.19	136.7
2018	19.7	709	13	27.8	9.47	186.5
2019	17.6	548	17	32.1	10.88	191.4
2020	5.1	210	9	24.3	10.90	55.6

Source: R. Chick (2020), *Stock Assessment Report 2020 - Red Sea Urchin and Turban Shell Fishery*, Table 1, p. 16.

N. Giles & M. Roswell (2020), *Management Report 2020 - Red Sea Urchin*, Figure 8, p. 20.