



Department of
Primary Industries

Fishery statistics summary 2021 – Sea Urchin and
Turban Shell Fishery

Red Sea Urchin (*Heliocidaris tuberculata*)

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Executive summary

This report provides updated fishery statistics for the NSW Sea Urchin and Turban shell (SUTS) Fishery- Red Urchin stock for 2021 and should be read in conjunction with the 2020 stock assessment report for Red Urchin (Chick 2020).

Stock status

The determination of stock status has not been revised from the 2020 stock assessment report and the status of the Red Urchin stock remains classified as **sustainable**. Importantly, this determination is reliant on a number of assumptions including an assumed biomass of Red Urchin, expected to be maintained at or about levels of an unfished stock, in areas closed to commercial fishing. Further, the 2020 assessment report stated that the status of the Red Urchin stock from areas open to commercial fishing is likely depleting. However, substantially reduced fishing mortality, from low levels of commercial catch in 2021, reduces the likelihood of stocks in areas open to fishing becoming depleted.

An assessment of the Red Urchin stock was not done in 2021 due to the low level of commercial fishery data and limited new data to reliably inform it. This decision was made by DPI Fisheries, in consultation with the NSW Total Allowable Fishing Committee (TAFC), understanding that the low level of catch has not been a function of low stock abundance but rather reduced domestic demand, primarily a consequence of COVID-19 management impacting on the domestic economy, particularly the restaurant trade.

Fishery statistics

In 2021 (to the end of August), the commercial fishery had reported a total catch of 2.5 t of Red Urchin. This is the lowest catch reported to the end of August since 2000 and ~25% of the last 5-year average catch to August. In 2021, the total catch was <5% of the allocated 60 t total allowable catch and ~13% of the total regional catch limits applied in 2021 (19 t). In 2021, 73 hours of effort was reported harvesting Red Urchin, the second lowest level of effort to August since 2000. In 2021, nominal catch rates (kg/hr) for harvesting Red Urchin together with other SUTS species on the same day and for Red Urchin only fishing days showed an increase from levels in 2020, although these catch rates remain among historically low levels.

Stakeholder engagement

- SUTS Fishery licence holders (or representatives) were invited to an online meeting where they were presented with an update of the fishery statistics for 2021, including a summary of the assessment report outputs from 2020. Feedback was sought, and provided, to inform the performance of the fishery and future assessments.
- Issues relating the biology and population size and structure of Red Urchins, fishing pressure and sustainable fishing practices were discussed.
- Anecdotal evidence was offered on the relatively high abundance, and larger size structure of Red Urchins in areas closed to commercial fishing.
- Strong support was offered to continue the commercial fishery catch sampling program and alternate data monitoring options were proposed to support future assessment and management options for the fishery.
- COVID-19 and other factors influencing fishery performance were discussed.

1. Stock status

The determination of stock status for the Sea Urchin and Turban Shell (SUTS) Fishery – Red Sea Urchin (*Heliocidaris tuberculata*, CAAB 25 247002, hereafter referred to as Red Urchin) has not been revised from the 2020 stock assessment report (Chick 2020) and the status of this stock remains classified as **sustainable**. However, as stated in the 2020 assessment report, this determination is complex and is reliant on an assumed biomass of Red Urchin, expected to be maintained at or about levels of an unfished stock, in areas closed to commercial fishing that comprise about 30% of the total area inhabited by Red Urchin in NSW, including SUTS Fishery specific closures since 1994 (~18% of area). Moreover, the 2020 assessment report stated that the status of the Red Urchin stock from areas open to commercial fishing is likely depleting. Whilst this determination remains, as no new determination of status is made from this summary of limited fishery statistics in 2021, reduced fishing mortality, from recent low commercial catches, reduces the likelihood of the biomass of Red Urchin, in areas open to fishing, becoming depleted.

This report provides a summary of the fishery statistics at the state-wide level for Red Urchin and the SUTS fishery as a whole (Appendix 1), from 2000 to 2021 (to the end of August). It updates those data presented in the 2020 stock assessment report (Chick 2020) and should be read in conjunction with it. The data in this 2021 report have not resulted in any substantial and unexpected change in previously reported data. The methodology and rationale for the determination of stock status, uncertainty in the assessment, and detailed presentations and interpretations of fishery statistics for Red Urchin at scales of the whole fishery (state-wide) and SUTS Regions and Subzones are provided in the 2020 assessment report.

An assessment of the Red Urchin stock was not done in 2021 due to the low level of commercial fishery data and limited new data available to reliably inform it. This decision was made by DPI Fisheries, in consultation with the NSW Total Allowable Fishing Committee (TAFC). The decision was made understanding and accepting that the low level of catch has not been a function of low stock abundance or availability of Red Urchin to the fishery but related to substantially reduced domestic demand (typically, local restaurants) as a result of public health orders related to the management of COVID-19.

Background information regarding the biology and stock structure of Red Urchin is described and cited in the 2020 stock assessment report (Chick 2020) and provides evidence for the determination of stock status of Red Urchin to be made at the biological stock level.

2. Fisheries statistics

Information regarding the structure and development of the SUTS Fishery (in particular, that for Red Urchin) together with a detailed interpretation of fishery statistics to inform the assessment was provided in the 2020 stock assessment report (Chick, 2020). This presented the weight of evidence for determination of stock status and support for the determination of a total allowable catch (TAC) for Red Urchin.

This update of state-wide fishery statistics in 2021, is provided to maintain a current series of these fishery statistics to inform stakeholders, including management decision makers (including the TAFC) and to support determination of a TAC for Red Urchin in 2022. Due to

the limited data in 2021, the presentation of data in this report to spatial scales below the state-wide level are restricted to the total catch at the SUTS Fishery Region level only. All reference to fishery statistics in 2021 includes data from January to the end of August 2021 only, unless otherwise stated.

2.1. Catch, effort and catch rate information

Commercial

In 2021, the commercial fishery had reported a total catch of 2.5 t of Red Urchin, harvested by 10 active fishers over a total of 73 hours (Figure 1 and Table 1). This is the lowest catch reported to the end of August since 2000 and equates to ~25% of the most recent 5-year (9.6 t), and ~35% of the 10-year (7.4 t) average catch to the end of August (excluding 2021). In 2021, the total catch was <5% of the allocated 60 t total allowable catch and ~13% of the total regional catch limits applied in 2021 (19 t) (Figure 1).

In the SUTS Fishery, fishers can harvest Red Urchin and/or other SUTS Fishery species on the same FisherDay, whilst still reporting species specific catch and effort. In 2021, 42 FisherDays and 49 hours were reported harvesting Red Urchin when also reporting the catch of other SUTS species (RU+SUTS) and only a total of 10 FisherDays and 24 hours were reported harvesting Red Urchin only (RU only) (Figure 2A and Table 2). These are the second lowest levels of effort reported for harvesting Red Urchin to the end of August since 2000. In 2021, catch rates (kg/hr and kg/day) from records where both Red Urchin and other SUTS species (RU+SUTS) and Red Urchin only (RU only) were harvested showed an increase from levels in 2020, with the exception of catch per day for (RU+SUTS) (Figure 3 and Table 3). Noting that the catch rates in 2021, remain among historically low levels.

Catch among Regions and as a proportion of annual catch has varied substantially through time (Figure 4 and Table 4). In 2021, the 2.5 t of catch was relatively evenly distributed among Regions 1 to 3 (range; 24-31%), with 17% of the total catch harvested from Region 4 (Table 4).

Notably, in late 2020, an industry-based catch sampling program was established (a recommendation from the TAFC in 2020). The objective of the program is to obtain size frequency data of commercially harvested Red Urchins. Instructions and a data sheet were made available to fishers to collect spatially referenced size-frequency information from each fishing day. Low levels of fishing in addition to other priorities of fishers has resulted in a limited number of samples from across the fishery in 2021 (i.e. a total of 410 Red Urchins measured, from two subzones; summary information from these data will be made available to the TAFC to inform their determination of a TAC for the 2022 fishing period).

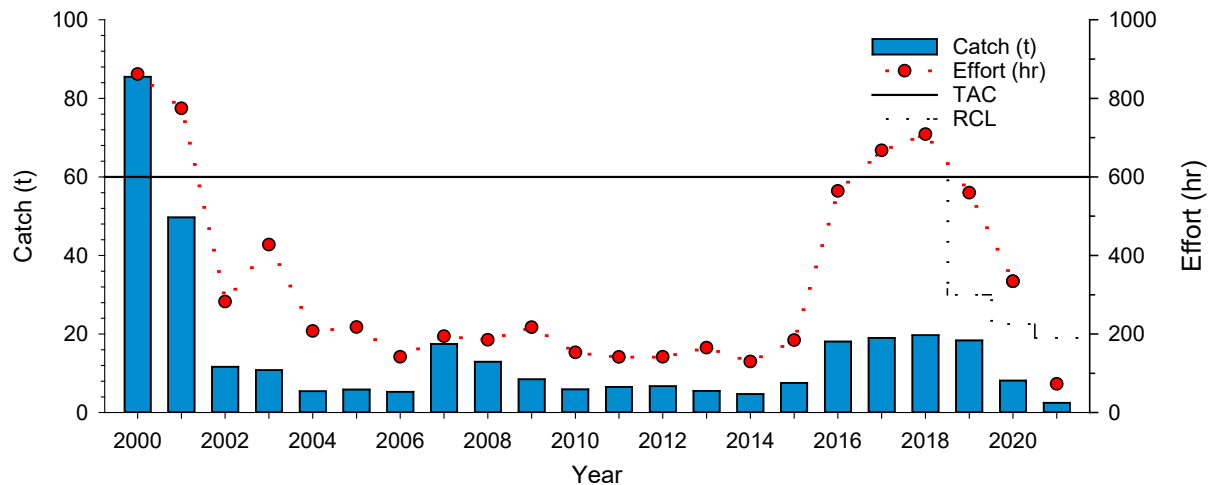


Figure 1 Annual catch (t), effort (hr), Total Allowable Catch (TAC) and total Regional Catch Limit (RCL) on Red Urchin in the Sea Urchin and Turban Shell (SUTS) Fishery, from 2000 to 2021* (*data to August).

Table 1 Annual catch (t), effort (hr) and number of active fishers harvesting Red Urchin in the SUTS Fishery, from 2000 to 2021* (*data to August). Effort excludes records with <0.25 or >8 hrs effort per FisherDay.

Year	Catch (t)	Effort (hr)	No. active fishers (RU)
2000	85.5	861	10
2001	49.7	774	13
2002	11.7	282	6
2003	10.8	427	9
2004	5.4	207	11
2005	5.9	217	14
2006	5.3	142	9
2007	17.5	194	8
2008	12.9	185	8
2009	8.5	217	12
2010	5.9	153	9
2011	6.6	141	9
2012	6.7	142	8
2013	5.5	165	9
2014	4.7	130	8
2015	7.5	184	9
2016	18.1	564	11
2017	19.0	667	16
2018	19.7	709	13
2019	18.4	559	17
2020	8.2	334	13
2021*	2.5	73	10

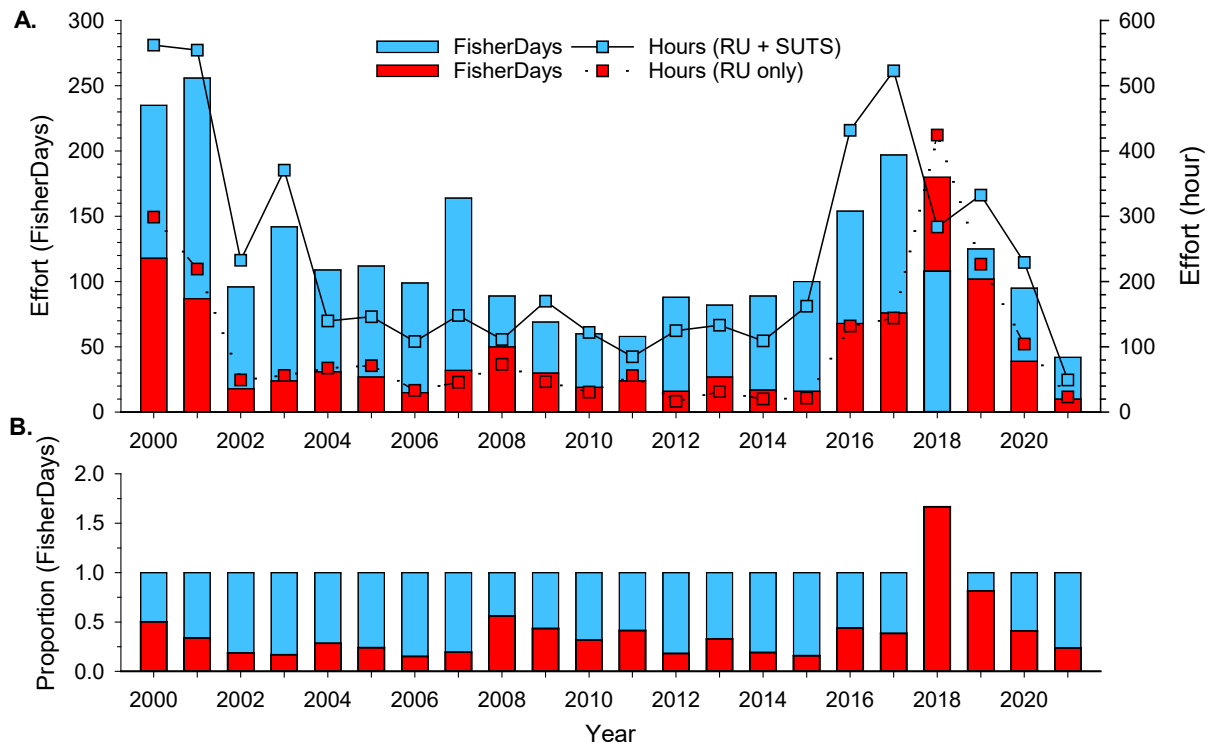


Figure 2 Whole Fishery – Effort – A. Number of FisherDays and hours where Red Urchin and other SUTS species (RU + SUTS) and Red Urchin only (RU only) were reported; and B. FisherDays (RU only) as a proportion of FisherDays (RU + SUTS), from 2000 to 2021* (*data to August).

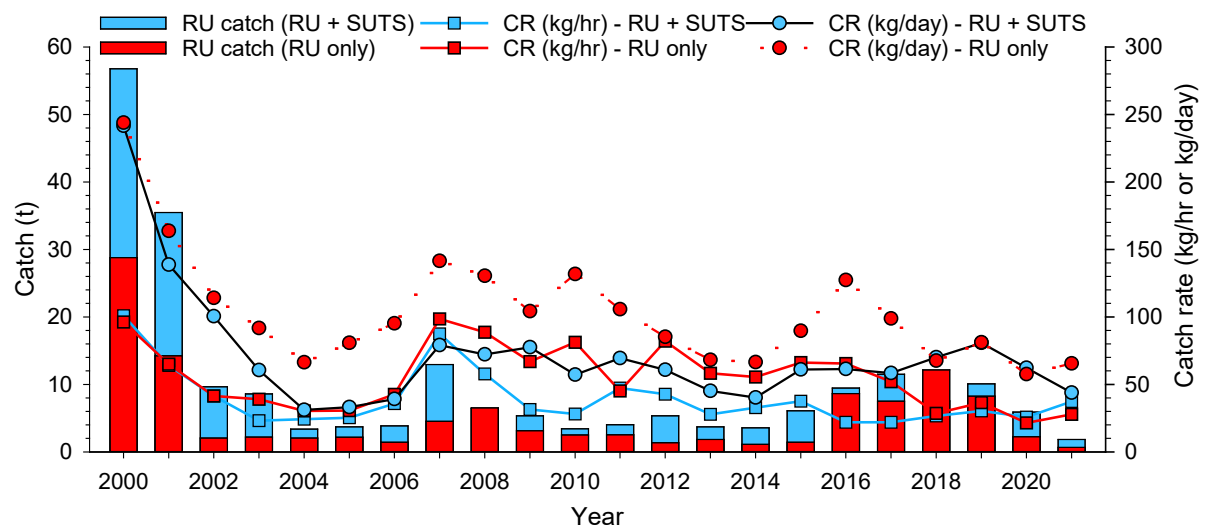


Figure 3 Whole Fishery – Effort – A. Number of FisherDays and hours where Red Urchin and other SUTS species (RU + SUTS) and Red Urchin only (RU only) were reported; and B. FisherDays (RU only) as a proportion of FisherDays (RU + SUTS), from 2000 to 2021* (*data to August).

Table 2 Whole Fishery – Effort – Number of FisherDays and hours where Red Urchin and other SUTS species were reported (RU + SUTS) and Red Urchin only were reported (RU only); and FisherDays (RU only) as a proportion of FisherDays (RU + SUTS), from 2000 to 2021* (*data to August).

Year	FisherDays (A) (RU + SUTS)	FisherDays (B) (RU only)	Proportion FisherDays (B/A)	Effort (hr) (RU + SUTS)	Effort (hr) (RU only)
2000	235	118	0.50	562	299
2001	256	87	0.34	555	219
2002	96	18	0.19	233	50
2003	142	24	0.17	371	56
2004	109	31	0.28	140	68
2005	112	27	0.24	146	71
2006	99	15	0.15	108	33
2007	164	32	0.20	148	46
2008	89	50	0.56	111	74
2009	69	30	0.43	170	47
2010	60	19	0.32	122	31
2011	58	24	0.41	85	56
2012	88	16	0.18	125	17
2013	82	27	0.33	133	32
2014	89	17	0.19	109	20
2015	100	16	0.16	162	22
2016	154	68	0.44	432	132
2017	197	76	0.39	523	144
2018	108	180	1.67	284	425
2019	125	102	0.82	333	227
2020	95	39	0.41	230	104
2021*	42	10	0.24	49	24

Table 3 Whole Fishery – Catch and catch rate – Catch of Red Urchin on FisherDays where Red Urchin and other SUTS species were reported (RU + SUTS) and Red Urchin catch from FisherDays (RU only); Catch rate (kg/hr and kg/day) from FisherDays (RU + SUTS) and FisherDays (RU only), from 2000 to 2021* (*data to August). Catch rate data excludes FisherDays with effort <0.25 and >8 hr.

Year	Catch (t) (RU + SUTS)	Catch (t) (RU only)	CR (kg/hr) (RU + SUTS)	CR (kg/hr) (RU only)	CR (kg/day) (RU + SUTS)	CR (kg/day) (RU only)
2000	56.76	28.78	100.9	96.2	241.5	243.9
2001	35.48	14.24	64.0	64.9	138.6	163.6
2002	9.65	2.05	41.4	41.4	100.5	114.0
2003	8.59	2.20	23.2	39.0	60.5	91.6
2004	3.38	2.06	24.2	30.4	31.0	66.3
2005	3.70	2.18	25.3	30.6	33.1	80.7
2006	3.87	1.43	35.7	42.6	39.1	95.2
2007	12.95	4.53	87.4	98.5	79.0	141.4
2008	6.43	6.52	57.7	88.6	72.2	130.4
2009	5.35	3.13	31.4	66.9	77.5	104.2
2010	3.43	2.50	28.0	81.2	57.1	131.7
2011	4.02	2.53	47.3	45.1	69.4	105.6
2012	5.34	1.36	42.8	82.0	60.7	85.2
2013	3.70	1.84	27.8	58.2	45.2	68.1
2014	3.58	1.13	32.7	55.5	40.2	66.4
2015	6.10	1.43	37.6	66.2	61.0	89.6
2016	9.45	8.65	21.9	65.5	61.4	127.2
2017	11.50	7.50	22.0	52.0	58.4	98.7
2018	7.56	12.14	26.6	28.6	70.0	67.5
2019	10.09	8.26	30.3	36.5	80.7	81.0
2020	5.91	2.24	25.7	21.5	62.2	57.5
2021*	1.84	0.65	37.3	27.8	43.8	65.4

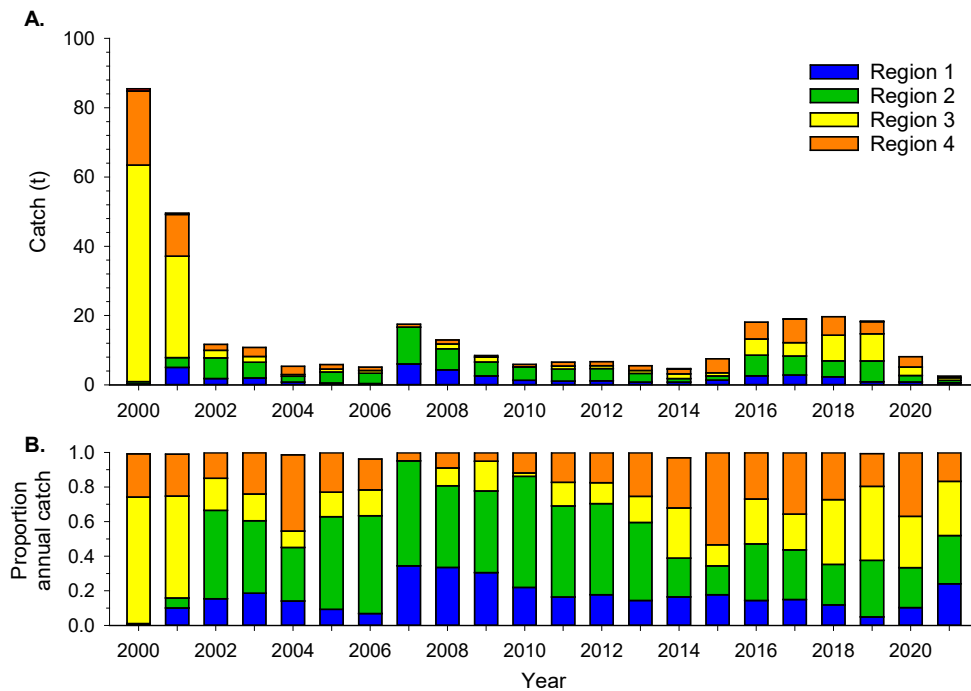


Figure 4 A. Catch (t); and B. Proportion of annual catch for Regions 1-4, from 2000 to 2021* (*data to August).

Table 4 Catch (t) (percent) for Regions 1-4, from 2000 to 2021* (*data to August).

Year	Region 1 Catch (t) (%)	Region 2 Catch (t) (%)	Region 3 Catch (t) (%)	Region 4 Catch (t) (%)
2000	0.27 (0.3)	0.68 (0.8)	62.50 (73.1)	21.37 (25)
2001	5.02 (10.1)	2.85 (5.7)	29.28 (59)	12.07 (24.3)
2002	1.81 (15.5)	5.97 (51)	2.17 (18.5)	1.75 (15)
2003	2.00 (18.6)	4.53 (42)	1.67 (15.5)	2.58 (23.9)
2004	0.77 (14.3)	1.69 (31.4)	0.52 (9.6)	2.40 (44.7)
2005	0.55 (9.3)	3.15 (53.5)	0.83 (14.2)	1.35 (23)
2006	0.36 (7.1)	3.00 (58.8)	0.79 (15.5)	0.95 (18.6)
2007	6.03 (34.5)	10.60 (60.6)	0.00 (0)	0.85 (4.9)
2008	4.34 (33.5)	6.11 (47.2)	1.33 (10.3)	1.16 (9)
2009	2.58 (30.5)	4.00 (47.2)	1.45 (17.2)	0.43 (5.1)
2010	1.30 (22)	3.80 (64.2)	0.12 (2.1)	0.70 (11.8)
2011	1.08 (16.4)	3.45 (52.6)	0.90 (13.6)	1.14 (17.3)
2012	1.19 (17.7)	3.53 (52.7)	0.82 (12.2)	1.17 (17.4)
2013	0.80 (14.4)	2.50 (45.1)	0.83 (15)	1.41 (25.4)
2014	0.78 (16.5)	1.05 (22.4)	1.37 (29.1)	1.36 (29)
2015	1.34 (17.8)	1.26 (16.7)	0.92 (12.2)	4.02 (53.3)
2016	2.61 (14.4)	5.93 (32.8)	4.69 (26)	4.87 (26.9)
2017	2.84 (15)	5.46 (28.7)	3.92 (20.6)	6.74 (35.5)
2018	2.35 (11.9)	4.61 (23.4)	7.38 (37.5)	5.37 (27.2)
2019	0.90 (4.9)	5.99 (32.7)	7.86 (42.8)	3.47 (18.9)
2020	0.84 (10)	1.89 (23.1)	2.42 (29.7)	3.01 (36.9)
2021*	0.60 (24)	0.69 (27.8)	0.78 (31.3)	0.42 (16.7)
Min [#]	0.27 (0.3)	0.68 (0.8)	0.00 (0)	0.43 (4.9)
Max [#]	6.03 (34.5)	10.60 (64.2)	62.50 (73.1)	21.37 (53.3)
Mean (5 Yr) [#]	2.01 (9.3)	3.66 (28.4)	3.66 (31.3)	4.47 (29.1)
Mean (10 Yr) [#]	1.52 (12.9)	3.56 (33)	2.24 (23.9)	2.72 (28.8)

excludes 2021 data

Recreational fishery

In NSW, there is a recreational daily bag limit of ten sea urchins (Red Urchin and/or other sea urchin species). Recreational fishery statistics for the harvest of sea urchins are limited. During 2018-19, NSW recreational fishery retained harvest estimates for all sea urchins was about 1 t (~2400 individuals) (Murphy et al. 2020), the majority of which are considered Longspined Sea Urchin. No recreational catch estimates for sea urchins are available from previous state and national recreational fishing surveys, with sea urchins either not having been reported (West et al. 2015) or included into a species reporting group 'Other Taxa' along with various other 'non-fish' species (Henry and Lyle, 2003).

Aboriginal cultural fishery

There are limited data to inform the level of catch from Aboriginal fishers in NSW. Synthesis of catch composition from Indigenous fisheries indicated that the SUTS Fishery overlaps with Indigenous fisheries (Schnierer and Egan 2016) and sea urchins were identified by Aboriginal fishers in a 1999 survey, as a species either targeted or harvested. Further, in the Tweed region, annual catch of sea urchins (unidentified species) by Aboriginal fishers was estimated at 1.8% of total harvest. Schnierer (2011) described the importance of marine invertebrate species as culturally important but did not specify sea urchins in this study.

2.2. Illegal Unregulated and Unreported

The level of Illegal Unregulated and Unreported (IUU) fishing has not been quantified.

NSW Fisheries Compliance provide annual summaries of seizures of fish and invertebrates due to non-compliance ([NSW DPI Fishing compliance](#)). These reports indicate regular seizures of sea urchins (range 482-1274 sea urchins p.a.) within financial years between 2014-15 and 2019-20. In 2019-20, 920 sea urchins and 2 905 turban shell were seized.

3. Stakeholder engagement

Contemporary data supporting the assessment of Red Urchin are fishery-dependent i.e. sourced from logbook data provided by commercial fishers in the NSW SUTS Fishery. NSW DPI Fisheries convened an online meeting of SUTS Fishery licence holders, divers, or their representatives and presented a summary of information in this report together with that from the 2020 assessment report (Chick 2020). The objective was to present the data and its interpretation and gain feedback and any other information, from stakeholders who have contributed to the data, to help inform assessments.

Stakeholders expressed high levels of support for the information provided in the reports and opportunity to engage and contribute to the stock assessment process. Points raised by stakeholders and grouped by the sub-headings below, included:

Biology and population structure

- Commercial fishers consistently reported observations from different areas along the NSW coast, of very high Red Urchin abundance and larger Red Urchins in areas closed compared to those open to fishing.
- Some anecdotal evidence of a greater abundance of smaller Red Urchins in areas open to fishing since the introduction of the 95 mm MLS.

- There are some real or perceived mutual benefits to Red Urchin population resilience and roe quality and Purple Urchin roe quality through the harvesting, or culling, in appropriate areas, of Purple Urchins.

Monitoring and assessment:

- There is strong support from commercial fishers for data collection through the commercial catch sampling program, to support an assessment of the efficacy of the 95 mm MLS and to develop a longer time series of data to inform the stock assessment.
- Adoption of GPS logging technology on commercial vessels was proposed to provide additional, cost-effective information into future assessments and improve compliance, whilst reducing risk from commercial fishing in any change to the management of areas open and closed to the fishery.

Fishery operations and data interpretation

- Access to the resource was raised as key to adequately distribute fishing effort and ensure fishing pressure on stocks in areas open to fishing is not reducing stock productivity. However, there is concern of large daily catches by some fishers in any areas newly opened to fishing resulting in long-term lost productivity and negative economic impacts through reduced price from over supply.
 - o The risk of overfishing Red Urchin stocks in areas previously closed to fishing was suggested to be largely offset by existing management controls (limited entry, regional catch limits, minimum legal size (95 mm)) and potential new controls (e.g. daily catch limits (~60-100 kg), seasonal closure (Dec. to Apr. inclusive)).
 - o Areas currently open to fishing can support a two-year rotational harvest for 'good stock recovery'. However, more regularly fished areas are not supporting desirable or expected levels of catch, and high daily catches (>100-150 kg) from relatively small areas result in long-term losses of productive stock, as has been observed in some areas within the last 12-24 months.

Market and economic issues

- The impacts of COVID-19 were identified as a major factor influencing the performance of the fishery during 2020 and 2021. The reduced levels of tourism as well as closures of restaurants during this time was seen as the primary reason for significantly reduced demand, and hence reduced supply (reduced catch in 2020 and low catch in 2021).
- Other factors described as likely impacting on the demand for Red Urchin included:
 - o The negative press, social media and institutional communication regarding the role of Purple Urchins in creating barrens, being a threat to marine ecosystems and biodiversity and their 'pest' status in other jurisdictions. The result being a proportion of potential market of Sea Urchin product being dissuaded to buy it (including Red Urchin)
 - o Large daily catches (e.g. 300 kg) being 'dumped' on the market floor of the Sydney Fish Market resulting in a drop in the price needed to support an economically viable and ecologically sustainable fishery. Supply needs to be managed to ensure fishers obtain \$AUD12-16 kg⁻¹.

4. References

- 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.
- Henry, G.W. and Lyle, J.M. 2003. The national recreational and Indigenous fishing survey. Fisheries Research and Development Corporation, Canberra.
- Murphy, J.J., Ochwada-Doyle, F.A., West, L.D., Stark, K.E. and Hughes, J.M., 2020. The NSW Recreational Fisheries Monitoring Program - survey of recreational fishing, 2017/18. NSW DPI - Fisheries Final Report Series No. 158.
- Schnierer, S. 2011. Aboriginal fisheries in New South Wales: determining catch, cultural significance of species and traditional fishing knowledge needs. Project No. 2009/038. Report to the Fisheries Research and Development Corporation, Canberra.
- Schnierer, S. and Egan, H. 2016. Composition of the Aboriginal harvest of fisheries resources in coastal New South Wales, Australia. Reviews in Fish Biology and Fisheries 26: 693–709.
- West, L.D., Stark, K.E., Murphy, J.J., Lyle, J.M. and Ochwada-Doyle, F.A. 2015. Survey of recreational fishing in New South Wales and the ACT, 2013/14. Fisheries Final Report Series No. 149. NSW Department of Primary Industries, Wollongong.

Appendix 1 – Sea Urchin and Turban Shell Fishery – All species – Summary fishery statistics

SUTS Fishery species catch

The total reported catch (t) of each of the species described in the Sea Urchin and Turban Shell (SUTS) Fishery, from 2000 to 2021 (data to Aug 2021) are provided in Figure A1-1 and Tables A1-1 (Sea Urchin) and A1-2 (Turban Shell). Species catch as a percentage of total annual catch of all SUTS species is provided in Figure A1-2 and Tables A1-1 (Sea Urchin) and A1-2 (Turban Shell). The catch of Turban Shell was reported to species from mid-2009. Prior to this date all Turban Shell catch was reported to the code 'Turban Shell – other'. Similarly, the code 'Sea Urchin – other' is a reporting code available to fishers.

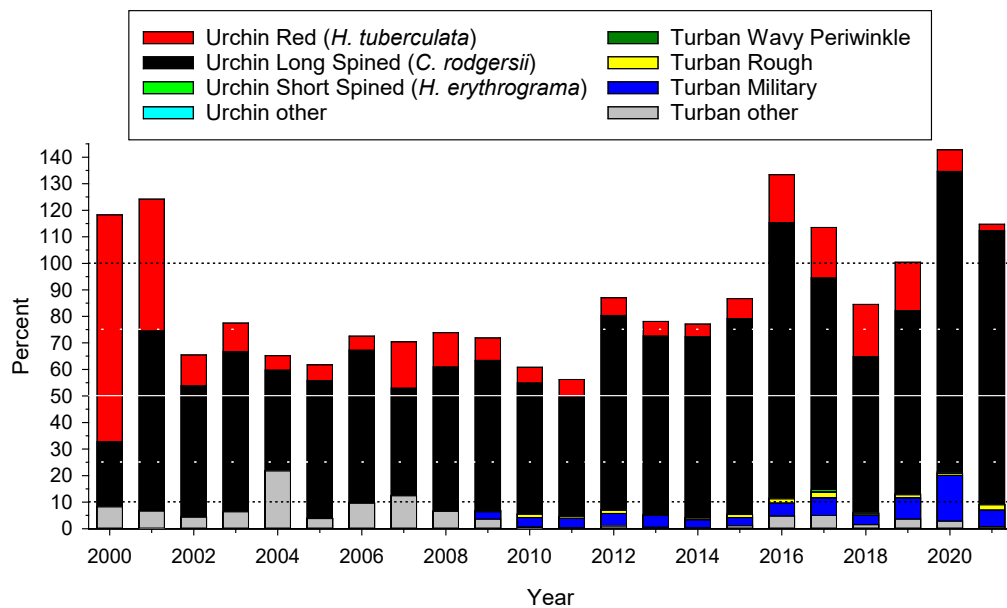


Figure A1 - 1 Annual catch (t) of all SUTS Fishery species, from 2000 to 2021* (*data to August).

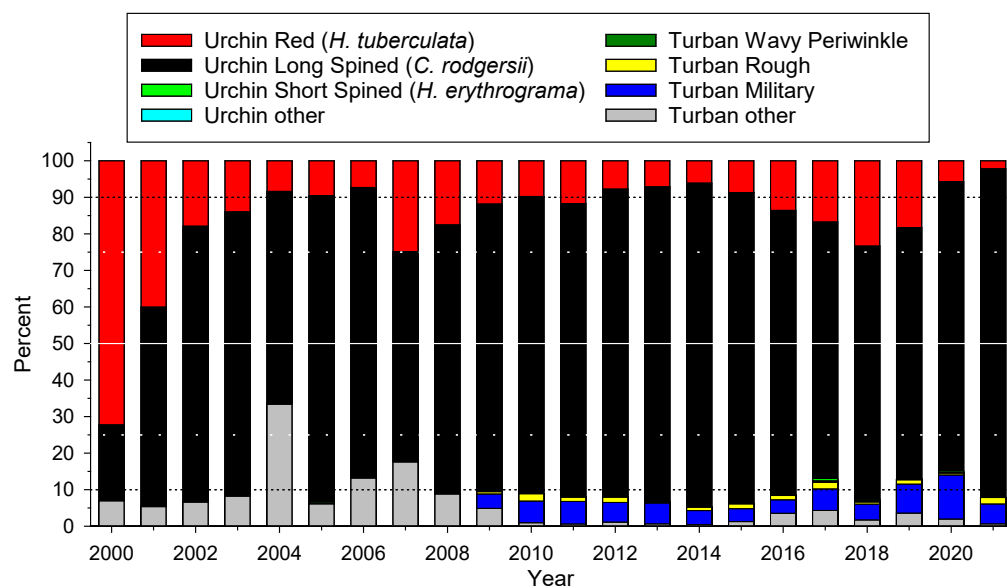


Figure A1 - 2 Annual catch (t) of all SUTS Fishery species, from 2000 to 2021* (*data to August).

Table A1 - 1 Annual catch (t) of each species of Sea Urchin and percent of total annual catch of all SUTS species (%), from 2000 to 2021* (*data to August).

Year	Urchin-Red Urchin Catch (t) (%)	Urchin-Long Spined Catch (t) (%)	Urchin-Short Spined Catch (t) (%)	Urchin_other Catch (t) (%)
2000	85.5 (72.3)	24.5 (20.7)	0.1 (0.06)	
2001	49.7 (40.03)	67.7 (54.5)	0.2 (0.14)	
2002	11.7 (17.9)	49.4 (75.5)	0.04 (0.06)	
2003	10.8 (13.9)	60.3 (77.9)	0.01 (0.02)	
2004	5.4 (8.3)	38.0 (58.2)	0.04 (0.06)	
2005	5.9 (9.5)	51.8 (83.9)	0.3 (0.47)	
2006	5.3 (7.3)	57.3 (79.1)	0.4 (0.48)	
2007	17.5 (24.8)	40.5 (57.6)	0.03 (0.04)	
2008	12.9 (17.5)	54.4 (73.7)		
2009	8.5 (11.8)	56.6 (78.8)		
2010	5.9 (9.8)	49.5 (81.4)		
2011	6.6 (11.7)	45.1 (80.4)		
2012	6.7 (7.7)	73.3 (84.3)	0.01 (0.01)	0.01 (0.01)
2013	5.5 (7.1)	67.3 (86.2)	0.1 (0.12)	
2014	4.7 (6.1)	68.3 (88.6)		
2015	7.5 (8.7)	73.8 (85.1)	0.04 (0.04)	
2016	18.1 (13.6)	103.9 (77.9)	0.1 (0.05)	0.1 (0.05)
2017	19.0 (16.7)	79.7 (70.2)	0.8 (0.7)	0.02 (0.01)
2018	19.7 (23.3)	58.6 (69.3)	0.3 (0.32)	0.3 (0.37)
2019	18.4 (18.3)	69.1 (68.8)	0.04 (0.04)	0.01 (5.61)
2020	8.2 (5.7)	113.1 (79.2)	0.6 (0.45)	0.03 (5.14)
2021*	2.5 (2.2)	103.2 (90)	0.00 (0)	0.00 (0)

Table A1 - 2 Annual catch (t) of Turban Shell species, percent of total annual catch of all SUTS species (%), total catch of all SUTS Fishery species and number of active fishers in the SUTS fishery and harvesting Red Urchin, from 2000 to 2021* (*data to August).

Year	Turban-Wavy Periwinkle Catch (t) (%)	Turban-Rough Catch (t) (%)	Turban-Military Catch (t) (%)	Turban-other Catch (t) (%)	SUTS Fishery Total catch (t)	No. active fishers SUTS	RU
2000				8.2 (6.92)	118.3	14	10
2001				6.6 (5.34)	124.2	20	13
2002				4.3 (6.58)	65.5	10	6
2003				6.4 (8.2)	77.4	11	9
2004				21.7 (33.35)	65.2	12	11
2005				3.8 (6.09)	61.7	19	14
2006				9.5 (13.16)	72.5	11	9
2007				12.3 (17.54)	70.4	9	8
2008				6.5 (8.78)	73.9	11	8
2009		0.5 (0.64)	2.8 (3.89)	3.5 (4.88)	71.9	17	12
2010		1.2 (2.01)	3.6 (5.9)	0.6 (0.94)	60.8	12	9
2011	0.04 (0.06)	0.6 (1.13)	3.5 (6.21)	0.3 (0.56)	56.2	12	9
2012	0.1 (0.09)	1.2 (1.44)	4.7 (5.38)	1.0 (1.1)	87.0	12	8
2013	0.03 (0.04)	0.2 (0.21)	4.4 (5.69)	0.5 (0.62)	78.1	13	9
2014	0.1 (0.11)	0.7 (0.92)	2.9 (3.8)	0.4 (0.46)	77.1	16	8
2015	0.04 (0.04)	1.2 (1.33)	3.1 (3.55)	1.1 (1.24)	86.7	14	9
2016	0.1 (0.09)	1.6 (1.16)	4.9 (3.71)	4.7 (3.51)	133.4	16	11
2017	0.4 (0.32)	2.1 (1.81)	6.7 (5.88)	4.9 (4.3)	113.5	19	16
2018	0.1 (0.09)	0.5 (0.57)	3.7 (4.34)	1.4 (1.69)	84.5	17	13
2019	0.2 (0.17)	1.2 (1.2)	8.0 (8)	3.6 (3.5)	100.4	19	17
2020	0.3 (0.18)	0.7 (0.5)	17.2 (12.1)	2.7 (1.9)	142.8	22	13
2021*	0.02 (0.02)	2.0 (1.8)	6.3 (5.5)	0.7 (0.6)	114.7	16	10