The Senate

Environment and Communications References Committee

Win-win under our oceans: Climate-related marine invasive species

November 2023

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[1] As resolved by the Committee, Senator Whish-Wilson was appointed as Chair for this inquiry, for Senator Sarah Hanson-Young.

Contents

List of recommendations

Recommendation 1

3.88 The committee recommends that the government consider working closely with relevant state governments to capture and harness the benefits offered by an emerging fishery for long-spined sea urchins, including:

- **developing a new fishery for Centro, while supporting existing fisheries for rock lobster and abalone;**
- **maximising employment opportunities in harvesting and processing for urchin products;**
- **coordinating research and policy across jurisdictions to encourage an economically and ecologically self-sustaining Centro fishery;**
- **fostering programs to protect and restore kelp and reef ecologies and the species that depend upon them, including innovative cross-sectoral work with industry, environmental organisations and communities;**
- **involving local, regional and First Nations communities in these opportunities; and**
- **assisting to grow overseas and domestic markets for urchin products.**

Recommendation 2

4.69 The committee recommends that the government consider making an immediate national investment into Centro control, guided by the Centro Task Force Plan's action areas and goals.

Recommendation 3

4.70 The committee recommends that the government consider the continuation of the Centro Task Force to govern the national investment delivery, and drive coordination, implementation, and reporting.

Recommendation 4

4.71 The committee recommends that the government consider the establishment of a Centro Advisory Group led by the Commonwealth, to include representatives from Aboriginal community-controlled organisations, industry, researchers, commercial dive, processing and the recreational dive sector, to provide guidance, co-design, coordination and delivery of actions at a state and regional level.

Abbreviations and acronyms

AANSW	Abalone Association NSW
AIMS	Australian Institute of Marine Science
AIRF	Abalone Industry Reinvestment Fund
AMCS	Australian Marine Conservation Society
ARC	Australian Research Council
Centro	*Centrostephanus rodgersii* (long-spined sea urchin)
Centro Task Force or Task Force	National Centrostephanus Management Task Force
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COTS	crown-of-thorns starfish
CRC Program	Cooperative Research Centre Program
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEECA	Department of Energy, Environment and Climate Action, Victoria
EAC	East Australia Current
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EZAIA	Eastern (Victorian) Zone Abalone Industry Association
FRDC	Fisheries Research and Development Corporation
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
GHG	greenhouse gas emission
GSR	Great Southern Reef
IGAB	Intergovernmental Agreement on Biosecurity
IMAS	Institute for Marine and Antarctic Studies
IPCC	Intergovernmental Panel on Climate Change

IPMA	Integrated Pest Management Approach
NAILSMA	North Australian Indigenous Land and Sea Management Alliance Ltd
Nature Conservancy	Nature Conservancy Australia
NDF	Non-Detrimental Finding (CITES requirement)
NESP	National Environmental Science Program
NRE Tas	Department of Natural Resources and Environment Tasmania
NRM South	Natural Resource Management South
NSW	New South Wales
NSW DPI	NSW Department of Primary Industries (Fisheries)
NSWALC	NSW Aboriginal Land Council
NZ	New Zealand
R&D	research and product development
SA	South Australia
SPRAT database	Species Profile and Threats Database
SST	sea surface temperature
TAC	Tasmanian Abalone Council
TARFish	Tasmanian Association for Recreational Fishing Inc.
TCDA	Tasmanian Commercial Divers Association
TRLFA	Tasmanian Rock Lobster Fishermen''s Association
TSAP	*Threatened Species Action Plan 2022–32*
TSIC	Tasmanian Seafood Industry Council
VFA	Victorian Fisheries Authority
VSUDA	(Eastern) Victorian Sea Urchin Divers Association

Executive Summary

Long-spined sea urchins (*Centrostephanus rodgersii*, abbreviated to 'Centro') are native to NSW, and are an important part of historical marine life in that state.

Changes to our marine environment, particularly warming oceans and shifting currents linked to climate change, are connected to explosions and radical range shifts in Centro's population distribution in recent decades.

The urchins' rapid spread on ocean currents (range shifting) to Victoria, Tasmania and recently New Zealand, where they are now deemed to be a significant threat to marine habitat, biodiversity and fisheries productivity, is a matter of national significance.

It is estimated there are now billions of these urchins in New South Wales (NSW) alone, and possibly hundreds of millions more spreading along the Great Southern Reef, the 8000 square kilometre inshore marine area between southern NSW through to Tasmania and Western Australia.

Scientists call Centro 'ecosystem engineers' as they can completely outcompete and dominate other species, and so radically change marine habitats where they settle and overgraze. Their voracious feeding behaviour can create large 'urchin barrens'—large swathes of rocky reef ecosystems that are barren of other previously endemic and flourishing biodiversity.

Witnesses described their impact as akin to creating 'under water moonscapes'. In video game terms, they are both the Pac-Man and Space Invaders of our oceans.

Where Centro is recognised as invasive, they have had a significant impact on marine ecology and both commercial and recreational fisheries. All invasive pests, including the overabundant native species, impose serious risks, costs, and challenges to our nation.

While most Australians are familiar with the spread of terrestrial or land-based pests, they are less familiar with the damage caused by marine invasive species such as Centro, the subject of this inquiry.

While it is recognised that marine invasive pests cause significant environmental and economic damage, there is low public awareness of this menace and they are rarely a priority of governments.

This inquiry seeks to change this situation.

Given climate change presents a host of new challenges to our oceans, including driving the spread of marine invasive species both introduced and native, examining the current Centro challenge in this inquiry has been an important window into the future.

There is no time like the present to prepare new, modern, and informed policy solutions to adapt to such challenges and build on this experience for the future.

This inquiry was motivated by the fact that there is, concerningly, currently no clear and holistic national policy pathway for managing overabundant native marine species like Centro. If left unchecked, these species can and do cause significant ecological, social and economic damage.

While the risks posed by the spread and population explosion of Centro to our precious marine environment and valuable fisheries have been understood for decades, from a policy perspective, attempts to research, monitor, and manage this invasive species across or within different state jurisdictions have been un-coordinated, ad hoc, inconsistent and insufficient.

We hope that this will change with the release of this timely Senate committee report.

The key finding of this inquiry was that national coordination by the Commonwealth to manage the risks from the spread of Centro is sorely needed. Three states currently face challenges from Centro management, NSW, Victoria and Tasmania. The challenge is different for each state, but if all parties work with the Commonwealth there are clear benefits to effectively managing Centro in a unified approach.

Recognition by the Federal Government of the need to tackle the negative impacts of overabundant native marine species already exists with the Crown-of-Thorns starfish program on the Great Barrier Reef. The government has committed hundreds of millions of dollars of funding for integrated pest management strategies on the Great Barrier Reef over many years to tackle this pest, aimed at protecting marine ecosystems and reef economic tourism values.

While this precedent exists, over recent decades only a fraction of such government funding has been allocated to research, monitor, and manage a similar and arguably bigger threat to our oceans: the destructive march of the long-spined sea urchin down the Great Southern Reef that runs along much of Australia's eastern seaboard.

The significant and uncontroversial evidence collected through this inquiry, and covered in the report, quantifies the damage done by Centro, especially in Victorian and Tasmanian waters, and highlights the urgent need to act on this menace.

What was most heartening about this inquiry was the compelling evidence that solving this problem presents significant environmental, social, and economic opportunities, a rare simultaneous win-win for our environment and our economy.

While Centro may be considered a destructive marine pest in parts of the country, it can be harvested, processed, consumed, and exported as a premium food.

A successful policy platform to tackle the risks posed by the proliferation of Centro is 'nature positive' in every sense of the word and almost certainly economically positive.

Establishing a viable national fishery for long-spined sea urchins will help solve an environmental problem, take pressure off other valuable fisheries such as abalone and rock lobster, build a restoration economy, promote blue carbon and nitrogen development opportunities, and should create significant new fisheries jobs and growth.

An ounce of prevention is worth a tonne of cure.

Evidence to support this environmental and economic opportunity is outlined throughout the report.

Tackling this critical problem in the right way would be a win-win solution that should have broad political appeal and support.

Significantly, and possibly unprecedented for a Senate inquiry, hundreds of stakeholders including three state governments, federal agencies, First Nations communities, commercial and recreational fishing stakeholders, scientists, academics, divers and tourism operators came together to formally workshop solutions to the Centro problem. The detailed outcomes of this workshop, including the establishment of a National Centro Task Force, were presented to the Senate committee to inform its inquiry.

Evidence provided to this inquiry from stakeholders from around the Great Southern Reef, argued repeatedly that this critical marine habitat should have its own national marine stewardship programs and structures, just like the more famous Great Barrier Reef in the north of Australia.

The committee is grateful for all the collaboration with the Workshop and Task Force and outcomes from this are featured in the report.

The unique, pressing, and complex nature of tackling marine invasive species like Centro requires just as unique and innovative an approach to coordinating policy development around the nation.

Unanimous evidence was provided to the committee that only the Commonwealth Government is in a position to lead, coordinate and execute such policy, which by its very nature will be long term, collaborative and rely on multi-disciplinary research.

We were fortunate that this inquiry brought together the nation's best minds to tackle this great challenge of our time, offering immense opportunity to

fisheries, First Nations and other communities, new export markets and ecological restoration.

Its findings cannot be ignored.

Committee recommendations:

The committee recommends that the government consider working closely with relevant state governments to capture and harness the benefits offered by an emerging fishery for long-spined sea urchins, including:

- **developing a new fishery for Centro, while supporting existing fisheries for rock lobster and abalone;**
- **maximising employment opportunities in harvesting and processing for urchin products;**
- **coordinating research and policy across jurisdictions to encourage an economically and ecologically self-sustaining Centro fishery;**
- **fostering programs to protect and restore kelp and reef ecologies and the species that depend upon them, including innovative cross-sectoral work with industry, environmental organisations and communities;**
- **involving local, regional and First Nations communities in these opportunities; and**
- **assisting to grow overseas and domestic markets for urchin products.**

The committee recommends that the government consider making an immediate national investment into Centro control, guided by the Centro Task Force Plan's action areas and goals.

The committee recommends that the government consider the continuation of the Centro Task Force to govern the national investment delivery, and drive coordination, implementation, and reporting.

The committee recommends that the government consider the establishment of a Centro Advisory Group led by the Commonwealth, to include representatives from Aboriginal community-controlled organisations, industry, researchers, commercial dive, processing and the recreational dive sector, to provide guidance, co-design, coordination and delivery of actions at a State and regional level.

Chapter 1
Introduction

1.1 On 5 September 2022, the Senate referred an inquiry into the spread of climate-related marine invasive species (the inquiry) to the Senate Environment and Communications References Committee (the committee) to inquire into:

> The spread of climate-related marine invasive species, particularly long spined sea urchins (*Centrostephanus rodgersii*) along the Great Southern Reef, with particular reference to:
>
> (a) the existing body of research and knowledge on the risks for and damage to marine biodiversity, habitat and fisheries caused by the proliferation and range shifting of non-endemic long spined sea urchins;
> (b) management options, challenges and opportunities to better mitigate or adapt to these threats, and governance measures that are inclusive of First Nations communities;
> (c) funding requirements, responsibility, and pathways to better manage and co-ordinate stopping the spread of climate-related marine invasive species;
> (d) the importance of tackling the spread of invasive urchin 'barrens' to help facilitate marine ecosystem restoration efforts (such as for Tasmanian Giant Kelp *Macrocystis pyrifera*); and
> (e) any other related matters.[1]

1.2 The Senate originally set a reporting date of 1 March 2023. After several extensions, the final reporting date for the inquiry was 3 November 2023.[2]

Scope of this inquiry

1.3 This inquiry was established to consider the range spread of the native long-spined sea urchin (*Centrostephanus rodgersii*)—commonly called 'Centro'—which is an endemic species to New South Wales (NSW) waters.[3] In particular, the inquiry considered the range extension of Centro into new areas of the

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1 *Journals of the Senate*, No. 8, 5 September 2022, pp. 212–213.

2 On 6 March 2023, the Senate accepted a progress report that recommended an extension of time to report until 31 July 2023 (*Journals of the Senate*, No. 33, 6 March 2023, pp. 1000 and 1013). The progress report was presented out of sitting, dated 15 February 2023 and received on 20 February 2023. On 31 July 2023, the committee was granted an extension of time for the report until 12 September 2023 (*Journals of the Senate*, No. 57, 31 July 2023, p. 1636). On 11 September 2023, the Senate granted a further extension of time to report until 18 October 2023 (*Journals of the Senate*, No. 69, 11 September 2023, p. 1974). On 18 October 2023, the committee was granted an extension of time for reporting to 2 November 2023 (*Journals of the Senate*, No. 75, 18 October 2023, p. 2136). On 31 October 2023, the committee was granted an extension to 3 November 2023.

3 Throughout this report the species name *Centrostephanus rodgersii* is abbreviated to 'Centro'.

Great Southern Reef (GSR) region, including the eastern coast of Victoria and Tasmania.

1.4 The inquiry was also established to consider where the Commonwealth could lead, support and collaborate on Centro management strategies. This included current and future actions undertaken by the states and industries individually and collaboratively, and where there are opportunities to draw on the knowledge of First Nations communities and their involvement in commercial or restoration programs.

1.5 A particular focus was leveraging the opportunities available in the management of Centro to develop industry and markets for commercial harvesting as a premium food product, including in Australia and overseas.

Background

1.6 Centro is an echinoderm, which means it is one of a family of marine invertebrates with spiky skin that includes starfish or sea stars, sea cucumbers, and other kinds of sea urchins. In Centro's case, it has very long, black moveable spines that contain an irritant toxin, used not only for its protection, but also sensing and locomotion.[4]

1.7 In a healthy and balanced ecosystem, populations of Centro are kept under control by natural predators, such as lobster and some large fish species, which can penetrate the urchin's spiny shell with their teeth, pincers and claws.[5] Centro has been described as an 'integral component of the sea scape' in NSW, where it is a native marine species.[6]

1.8 However, where populations of Centro are left unchecked by predators, they can become overabundant and overgraze vast areas known as 'urchin barrens' (areas devoid of marine plant life, see Figure 1.1 and Figure 1.2). Centro are well known for their ability to alter habitat structure through their grazing activity and have been described as an 'ecosystem engineer'.[7] Urchin barren formation transforms healthy kelp bed ecosystems into low productivity rocky ecosystems, and impacts the biodiversity dependent on these ecosystems. Barrens can span vast marine ecosystems, with individual barrens measuring up to hundreds of hectares.[8]

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4 Great Southern Reef Foundation, *Long spined sea urchin* (accessed 2 November 2023). Dr Kennedy Wolfe, *Submission 3*, p. 1; Professor Michael Kingsford, *Submission 11*, p. 2; and Professor Adriana Vergés, Professor Peter Steinberg and Dr Ezequiel Marzinelli, *Submission 21*, p. 3.

5 Great Southern Reef Foundation, *Long spined sea urchin.*

6 Professor Michael Kingsford, *Submission 11*, p. 2.

7 Australian Museum, *Description of Key Species Groups in the East Marine Region: Final Report*, September 2007, p. 70 (accessed 2 November 2023).

8 Institute of Marine and Antarctic Studies (IMAS), *Submission 38*, p. 4.

Figure 1.1 Centro barren forming within a giant kelp forest (Schouten Island, Tasmania, 2010)

Source: Dr Scott Ling (via the Institute for Marine and Antarctic Studies, Submission 38, p. 13.)

Figure 1.2 Fully established urchin barren

Source: IMAS, Long-Spined Sea Urchin (Centrostephanus rodgersii) (accessed 2 November 2023).

1.9 The transformation from kelp forests to urchin-barren rocky reefs also alters ecosystem services such as wave buffering and nutrient cycling, which affects the overall inshore ecosystem.[9]

1.10 Kelp forests provide critical habitats for both the juvenile and adult stages of some of 'Australia's most economically, socially and culturally valuable species and fishery resources'.[10] Kelp forests provide:

- a primary food source for abalone and lobsters;
- shelter from predation for post-larval juvenile fish that have newly recruited from pelagic larval stages;
- a chemical cue that allows planktonic larvae of lobster and finfish species to locate suitable habitat to recruit into;
- critical habitat for prey species of higher order predators, including reef fish and lobsters, seabirds, dolphins and Australian sea lions, and multiple shark species; and
- a means to capture nutrient flows from anthropogenic sources on land, potentially reducing the occurrence of negative environmental effects including algal blooms that impact fishery productivity and amenity values.[11]

Range expansion

1.11 Due to the impacts of climate change, Centro has significantly expanded its endemic range, spreading south through the GSR in Victorian and Tasmanian waters, and across to New Zealand (see Figure 1.3). The species spread is not only a result of warming oceans, but also a climate change-induced strengthening of the East Australian Current, which flows from around the Great Barrier Reef off the coast of Queensland, and down to the ocean south-east of Tasmania.[12]

1.12 The Tasmanian Government summarised this change in its submission:

> Coastal waters off the south-eastern coast of Australia are changing rapidly due to increasing ocean temperatures. Ocean temperatures off eastern Tasmania are estimated to have increased by 2°C in the past 100 years—three times the change in global average ocean temperature. The increasing frequency of marine heatwaves in recent years is compounded by a steady rise in the temperature of the EAC [East Australia Current], which together are increasingly impacting marine habitats and species, resulting in

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9 Centro Task Force, *National Longspined Sea Urchin: Towards a national five year business plan for collaborative management* (Centro Business Plan), September 2023, p. 5.

10 Australian Marine Conservation Society (AMCS), *Submission 37*, p. 2.

11 AMCS, *Submission 37*, p. 2.

12 Great Southern Reef Foundation, *Long spined sea urchin*. See also Lucy MacDonald, 'What will a warming East Australian Current change along the way?', *ABC Online*, 8 May 2021; and Katie Cresswell, Klaas Hartmann, Caleb Gardner, John Keane (IMAS), *Longspined Sea Urchin Fishery Assessment 2020/21*, April 2022, p. 8 (both accessed 2 November 2023).

depleted kelp forests and sea grasses, a poleward shift in some marine species, and increased occurrence of disease.[13]

Figure 1.3 Range shift of Centro

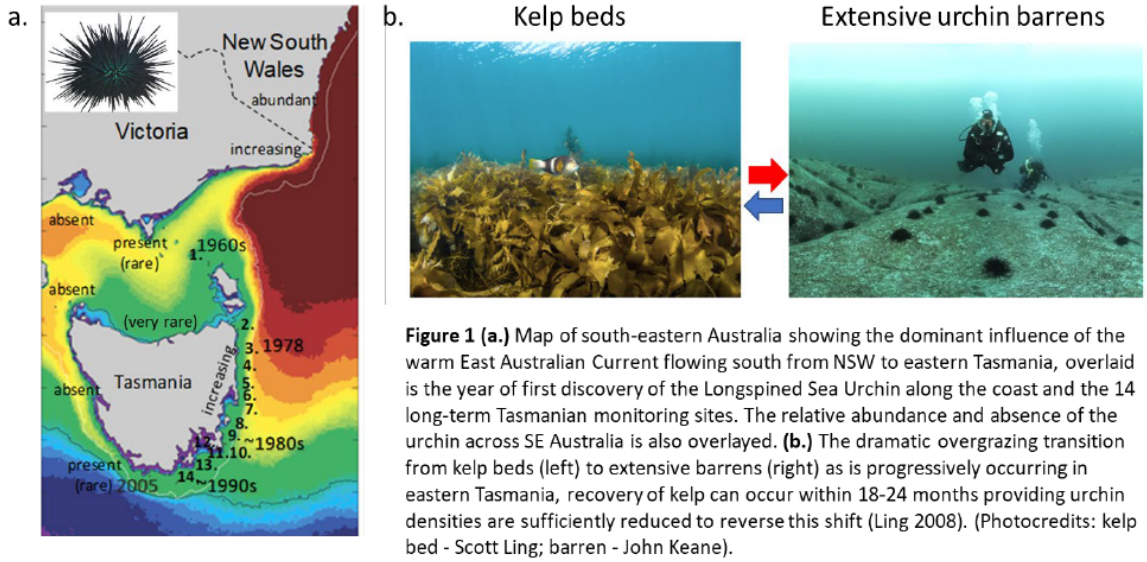

Figure 1 (a.) Map of south-eastern Australia showing the dominant influence of the warm East Australian Current flowing south from NSW to eastern Tasmania, overlaid is the year of first discovery of the Longspined Sea Urchin along the coast and the 14 long-term Tasmanian monitoring sites. The relative abundance and absence of the urchin across SE Australia is also overlayed. **(b.)** The dramatic overgrazing transition from kelp beds (left) to extensive barrens (right) as is progressively occurring in eastern Tasmania, recovery of kelp can occur within 18-24 months providing urchin densities are sufficiently reduced to reverse this shift (Ling 2008). (Photocredits: kelp bed - Scott Ling; barren - John Keane).

Source: IMAS, Submission 38, p. 5.

1.13 The spread of Centro outside its natural range represents a significant threat to the health of rocky reef ecosystems along the south-eastern coast of the Australian mainland and Tasmania. Urchin barrens have expanded rapidly along Tasmania's east coast, increasing from a total cover of 3 per cent in 1978 to 15 per cent in 2018.[14] Over the same time period, it is estimated that the number of Centro off the Tasmanian coast grew from two positively identified individuals in 1978, to around 11 million in 2002, and an estimated 20 million in 2018.[15]

1.14 Given the potential for similar exponential growth in NSW and Victoria, as well as in off-shore populations that are difficult to measure accurately, current urchin numbers in the Australian marine environment are potentially in the billions.

1.15 Despite the sheer size of urchin populations, and the devastating ecological and economic crisis this immense growth represents, many Australians remain unaware of the problem. In part, this could be due to marine invasive species being less visible than other, terrestrial invasive and feral pest species, which

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13 Tasmanian Government, *Submission 30*, p. 2.

14 IMAS, *Submission 38*, p. 4. Note that an official fisheries estimate of urchin biomass for Victoria was 45 000 tonnes in that state alone. See Ms Helen Burvill, Executive Officer, Eastern Zone Abalone Industry Association Inc., *Committee Hansard*, 6 June 2023, p. 8.

15 Centro Task Force, *Centro Business Plan,* September 2023, p. 14, citing Professor Scott Ling and Dr John Keane's survey for IMAS, 'Resurvey of the Longspined Sea Urchin (*Centrostephanus rodgersii*) and associated barren reef in Tasmania' (2018).

attract public interest and government funding for programs. This was argued by Dr Ian Dutton, the General Manager—Marine Resources, Department of Natural Resources and Environment Tasmania, who told the committee:

> … this is an issue that's occurring on the doorstep of more than half of Australia's population yet it's one that's not reached the level of national prominence that other comparable issues like crown-of-thorns starfish or if there is a terrestrial equivalent that had taken out 15 per cent of our terrestrial habitats in one state alone and significant areas of other states that are of great cultural and economic importance, we would have already reached some level of national focus.[16]

1.16 Centro also represents a significant economic threat, as the flow-on implications for businesses and industry dependent on these ecosystems and species decline are substantial. For example, it has been noted that the GSR contributes over $10 billion per annum to the Australian economy and underpins marine-based industry and businesses across NSW, Victoria and Tasmania.[17]

1.17 Centro management is an issue that exists across all the three states with Centro populations. However, the sheer scale of the challenge is perhaps best demonstrated by the available figures for Tasmania. Regionally, the loss of species, including over 150 species that live in Tasmanian kelp ecosystems, threatens parts of the fisheries for Blacklip Abalone and Southern Rock Lobster, which have an annual gross value of production of $50 million and $100 million respectively.[18] Moreover, the Centro problem also poses a serious problem for a healthy recreational fishing sector, which contributes around $270 million a year to gross state product and supports 2670 full time jobs.[19]

1.18 These figures are substantially increased when the threat to fisheries in NSW and Victoria are considered, as the combined value of the fishing industry in all three states is collectively between $200 and $250 million—before other sectors including recreational fishing, tourism and other blue economy businesses are factored in.[20]

1.19 The Institute for Marine and Antarctic Studies (IMAS) noted that 'of the approximately 77 marine range-extending species recently documented to have undergone climate-driven extension across Australia … the Longspined Sea

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16 See evidence provided by: Professor Scott Ling, ARC Future Fellow, IMAS; and Dr Ian Dutton, General Manager—Marine Resources, Department of Natural Resources and Environment Tasmania, Tasmania, *Committee Hansard*, 3 February 2023, pp. 3 and 59 respectively.

17 Centro Task Force, *Centro Business Plan*, September 2023, p. 5.

18 IMAS, *Submission 38*, p. 5. See also evidence provided by Mr Darvin Hansen, Managing Director, Tasmanian Seafoods Group, *Committee Hansard*, 3 February 2023, p. 15.

19 Ms Jane Gallichan, Chief Executive Officer, Tasmanian Association for Recreational Fishing Inc., *Committee Hansard*, 6 June 2023, p. 23.

20 Great Southern Reef Foundation, *Submission 35*, p. 2.

Urchin is the most ecologically important due to its ability to overgraze kelp habitats and maintain an alternative and hyper-stable barren grounds'.[21] In its analysis of the current outlook, IMAS noted that:

> The urchin represents the single largest and most immediate marine environmental threat to kelp-dominated reef ecosystems in south-eastern Australia. Extensive barrens threaten reef ecosystems from [around] 2–40 [metres] depth with local loss of hundreds of kelp-associated species, including lucrative fishery species such as abalone and lobster, plus the iconic weedy seadragon, as well as downgrading social, economic and cultural values.[22]

Opportunities for management

1.20 However, unlike many other pest and invasive species, the management of Centro also offers substantial opportunities for industry, as it is a culinary delicacy and also has potential use for other products. This was summed up by Dr Cayne Layton, IMAS Fellow and the Co-Founder and Director of Blue Carbon Services, in his evidence to the committee:

> I think the core point that we really want to make is that this is really an incredible opportunity for south-east Australia and for Australia in general, and it really is one of those rare opportunities where there is such massive potential for significant win-win-win opportunities against the triple bottom lines of environment, economics and also social and cultural benefits. That's obviously rural and regional economies across south-east Australia, Indigenous communities and organisations, fisheries, high-value seafood products, and our globally unique and absolutely remarkable Great Southern Reef and the threatened kelp forests that are the foundation of that system.[23]

1.21 Additionally, the benefits of reef and kelp forest rehabilitation and management programs have already been shown to provide impressive returns of from modest investments, not only from revived stocks for fisheries damaged by Centro populations, but also from increased biodiversity, and nitrogen and carbon values.[24]

1.22 These will be discussed further later in this report.

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21 IMAS, *Submission 38*, p. 5.

22 IMAS, *Submission 38*, p. 2.

23 Dr Cayne Layton, Co-founder and Director, Blue Carbon Services, *Committee Hansard*, 3 February 2023, p. 22.

24 As discussed further in chapter 2 of this report on the Victorian Beware Reef program, as well as the Tasmanian Abalone Industry Reinvestment Fund (AIRF). On Beware Reef, see: Mr Michael Irvine, Ranger Team Leader, Parks Victoria; and Mr Michael Sams, Manager, Marine and Coastal Sciences and Programs, Parks Victoria, both in *Committee Hansard*, 6 June 2023, p. 42. On the AIRF, see Fishing Tasmania, *Tasmanian Abalone Industry Reinvestment Fund* (2023).

Condition of Australia's broader marine environment

1.23 One of the recurring themes of this inquiry was the general condition of Australia's marine environment, in particular the warming of oceans caused by climate change.

1.24 This issue was comprehensively laid out in the Commonwealth's *State of the Environment Report 2021* (SOE), released in July 2022. On the impact of climate change on the marine environment, the SOE stated that 'the physical characteristics of the ocean, such as temperature, salinity, oxygen content and pH, are clearly changing in Australia's oceans as a result of climate change', and that:

> Pressures associated with climate change and associated extremes have high to very high impact on the Australian marine environment and are generally worsening. No pressures are assessed as improving.[25]

1.25 Further, the SOE reports that the south-east and south-west of Australia are global warming hotspots.[26]

1.26 The SOE particularly highlighted the danger posed to rocky reefs and kelp beds, specifically citing the risk of overgrazing by urchins as an impact of climate change, alongside several other factors:

- climate change, through rising temperatures and heatwaves, and nutrient and pH variation associated with changing current systems;
- overgrazing by sea urchins and other species, resulting from range extensions and removal of top predators by fishing; and
- decreasing water quality from coastal run-off.[27]

1.27 More generally, the SOE noted that 'extensive species redistributions are projected to occur around the Australian coastline for the foreseeable future' because of changing climate conditions.[28] This has also been noted in other research. For example, authors Gervais, Champion, and Pecl highlighted that 'marine species are shifting their distributions poleward on average six times faster than terrestrial species, as well as displaying nearly double the rate of extirpations [local extinctions]'.[29] Their paper continued:

> Extensive climate-driven environmental change is now apparent throughout Australian marine systems. The East Australian Current has

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25 Rowan Trebilco, Mibu Fischer, Cass Hunter, Alistair Hobday, Linda Thomas, and Karen Evans (Trebilco et al), *Australia State of the Environment 2021: Marine*, 2021, p. 83.

26 Trebilco et al, *Australia State of the Environment 2021: Marine*, 2021, p. 83.

27 Trebilco et al, *Australia State of the Environment 2021: Marine*, 2021, p. 39.

28 Trebilco et al, *Australia State of the Environment 2021: Marine*, 2021, p. 81.

29 Connor Gervais, Curtis Champion, and Gretta Pecl (Gervais et al), 'Species on the move around the Australian coastline: A continental-scale review of climate-driven species redistribution in marine systems', *Global Change Biology*, Vol. 27:14, 2021, p. 3201.

> extended a further 350 km southwards over the last 70 years, and both the south-east and south-west regions of Australia are recognized as ocean warming 'hotspots', in the top 10% for rates of temperate increase globally. Moreover, the rate of ocean warming around Australia has accelerated in recent decades, with the greatest increases in sea surface temperature (SST) occurring off the south-eastern coastline.[30]

1.28 The Intergovernmental Panel on Climate Change (IPCC), in their sixth assessment report noted the continued impact of greenhouse gas emissions on global warming and indicated that global warming is more likely than not to reach 1.5 degrees Celsius, even under a very low greenhouse gas emission (GHG) scenario. Further, the IPCC stated that many climate-related risks are projected to become increasingly severe with every increment of global warming (very high confidence).[31]

1.29 Concerningly, the SOE noted that 'detailed explorations' of the impacts of the range shifts caused by climate-related ocean changes are 'under-represented', leading to a lack of knowledge regarding the implications of widespread changes in species distributions, which may well have significant ecological impacts, as well as threatening the viability of some aquaculture and tourism industries.[32]

1.30 On funding, the committee understands that the Commonwealth has historically invested far more heavily in the management of tropical reefs, particularly the Great Barrier Reef, than it has in temperate reefs, such as the Great Southern Reef. For example, Dr Scott Bennett of the Great Southern Reef Foundation told the committee:

> … if we look at Australian Research Council funding to the Great Barrier Reef versus temperate reefs in Australia that we did in that 2016 study—those values are up until 2015 or 2014, I think—temperate reefs received four per cent of the funding that was allocated to coral reefs.
>
> … Since then, 2016 to 2020, the last five years or so, that increased slightly to around 21 per cent, but that was because of the end of the funding cycle for the Centre of Excellence for Coral Reef Studies. If you also consider the federal government investment directly to the Great Barrier Reef … the $535 million package in 2018 and all the additional funding the Great Barrier

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30 Gervais et al, 'Species on the move around the Australian coastline: A continental-scale review of climate-driven species redistribution in marine systems', *Global Change Biology*, Vol. 27:14, 2021, pp. 3200–3201.

31 The 'very high confidence' assessment indicates that the IPCC considers the likelihood of its occurrence as being at least 9 out of 10 chance of being correct. Intergovernmental Panel on Climate Change (IPCC), *AR6 Synthesis Report: Climate Change 2023, Longer Report* (accessed 2 November 2023).

32 Gervais et al, 'Species on the move around the Australian coastline: A continental-scale review of climate-driven species redistribution in marine systems', *Global Change Biology*, Vol. 27:14, 2021, p. 3201.

> Reef has received in the last five years—temperate reefs have received less than one per cent of funding.[33]

Centro Task Force 2023

1.31 In February 2023, a National Centrostephanus Management Task Force (Centro Task Force or Task Force) was formed to look into:

- cross-jurisdictional relationships and priorities in addressing the range expansion of Centro;
- maintenance of marine ecosystem health;
- interventions to manage levels of threatened species;
- strategies to rehabilitate damaged ecosystems;
- identification of potential new markets for sea urchins as a food product; and
- the productive utilisation of waste from food processing.[34]

1.32 The Task Force comprised of members of state fishery agencies, the Commonwealth, and Commonwealth agencies the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Fisheries Research and Development Corporation (FRDC). It met with more than 30 stakeholders over June and July 2023, and completed its work in the form of a five-year business plan for the collaborative management of Centro, published in early September 2023.

1.33 The plan makes three key recommendations, namely:

> 1) An immediate national investment of $55 million [over five years] into Centro control, guided by this Plan's action areas and priorities.
>
> 2) Continuation of the national Task Force to govern the national investment delivery, coordination, implementation and reporting (via a small secretariat hosted by a Task Force member).
>
> 3) Establishment of a National Centro Advisory Group including Traditional Owners, industry, researchers, commercial dive, processing and recreational dive sector representatives, to provide guidance, co-design, coordination and delivery of actions at a State and regional level.

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[33] Dr Scott Bennett, Co-director and Co-founder, Great Southern Reef Foundation *Committee Hansard*, 3 February 2023, p. 33.

[34] National Centrostephanus Management Business Planning Flyer, p. 1. This Task Force was informed and given impetus by a significant National Centro Workshop in early February 2023, which drew together many significant stakeholders, including the chair of this inquiry, Senator Peter Whish-Wilson. This workshop and the Task Force are both discussed at length in chapter 4 of this report.

1.34 The Task Force also identified several action areas and priorities to manage Centro, and four 'pillars for success'—principles that should underpin actions and priorities, as well as environmental and industry outcomes.[35]

1.35 The Task Force's Five Year Plan is discussed in greater detail in chapter 4 of this report.

Structure of the report

1.36 This report comprises 4 chapters, as follows:

- Chapter 1 provides an introduction and background to the inquiry;
- Chapter 2 provides an overview of the challenges faced by the range extension, environmental and economic impacts of Centro, as well as the approach of the states and Commonwealth to its management;
- Chapter 3 discusses evidence on potential opportunities offered by an effective Centro management strategy, including export opportunities as a premium foodstuff resource;
- Chapter 4 sets out evidence that supports a national strategic approach to coordinate and collaborate Centro management and environmental restoration programs, as well as the Task Force's proposed Five Year Business Plan. This chapter also includes the committee's view and recommendations.

Conduct of the inquiry

1.37 In accordance with its usual practice, the committee advertised the inquiry on its website and wrote to individuals and organisations inviting submissions by 13 October 2022. The committee continued to accept submissions received after this date.

1.38 The committee received 44 submissions, which are listed at Appendix 1. It also held three public hearings in: Hobart on 3 February 2023; Melbourne on 6 June 2023; and Sydney on 7 June 2023. A list of witnesses who participated in the hearings is at Appendix 2.

1.39 In February 2023, a National Centro Workshop was organised to inform the committee of the latest Centro research and management opportunities. It brought together 140 representatives from industry, government, research, First Nations communities, and other community members. The committee also received a private briefing from three representatives of the related Centro Task Force on 2 August 2023 at Parliament House, Canberra.

1.40 Public submissions, documents providing additional information, Hansard transcripts of the hearings and tabled documents are all available on the committee's website.

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35 Centro Task Force, *Centro Business Plan*, September 2023, p. 6.

Acknowledgement

1.41 The committee would like to thank all the individuals and organisations who contributed their time and expertise to the inquiry.

1.42 The committee also acknowledges the work undertaken by the Centro Task Force. The Task Force's work informed this inquiry, as it was able to engage in wide-ranging consultations with a very diverse range of stakeholders, and provided a proposal for a Five Year Business Plan for Centro management to the committee in mid-September 2023.

Chapter 2
Challenges and responses across jurisdictions

2.1 This chapter discusses the challenges posed by *Centrostephanus rodgersii* (Centro) in New South Wales (NSW), Victoria and Tasmania—environmentally, economically, and for communities that depend on marine resources. It also outlines the current management arrangements across these jurisdictions, considering relevant legal, policy and program frameworks.

2.2 In noting these challenges, this chapter also touches briefly on evidence received by the committee regarding South Australia, where there is currently no Centro population, as well as New Zealand, where the NSW strain of Centro has migrated across the Tasman Sea to establish urchin colonies.

2.3 This chapter concludes with an outline of relevant issues for the Commonwealth, including the environmental governance and legislative frameworks, as well as its role underpinning research into and monitoring of Australia's environmental and marine resources.

2.4 Later chapters discuss potential ways for the Commonwealth to play a leadership role in working with states and other stakeholders to address the challenge of Centro, as well as areas it could assist and support opportunities in the development of the urchin as a premium food product.

Differing challenges and management frameworks across jurisdictions

2.5 As noted in the previous chapter, the challenges of managing Centro differ between states significantly, in particular due to Centro being a native species in NSW where it is considered an integral part of the marine ecology, whereas it is a highly destructive invasive species in southern states.[1]

2.6 State and territory governments are primarily responsible for regulating environmental matters in their jurisdictions, including state and territory waters.[2] The Department of Climate Change, Energy, the Environment and Water (DCCEEW) noted that:

> All state and territory governments have legislation to conserve biodiversity and to retain and manage habitats, including through a conservation reserve system involving national parks, nature reserves, conservation parks and marine parks. State and territory governments operate native vegetation

[1] Please note discussion below on the role and place of Centro in NSW ecologies.

[2] Department of Climate Change, Energy, the Environment and Water (DCCEEW), *Submission 32*, p. 2.

> conservation programs, while also providing for sustainable development of lands and waters within their jurisdictions.[3]

2.7 The work of the National Centrostephanus Management Task Force (Centro Task Force or Task Force) in bringing together stakeholders across Commonwealth, states and other sectors was outlined in the previous chapter. It is discussed in more detail in chapter 4, which considers potential ways forward in Centro management.

New South Wales

2.8 Centro is endemic to NSW, so the management strategies adopted in that state are significantly different from those of Victoria and Tasmania.[4] However, there is some debate over whether the current level of urchin barrens is a natural feature of NSW's ecology, or an indication of human-induced changes to the environment.[5]

2.9 For example, Blue Carbon Services submitted that, while Centro is native to NSW:

> … there is conjecture about whether the extensive barrens they form in that region are part of the natural system or are a human-caused phenomena. This is especially since many barrens likely formed prior to systematic monitoring, which muddies our understanding of the natural baseline of the system. What is known however is that 1) extensive urchins barrens, such as those seen in New South Wales, are not a natural feature of any other reef system anywhere else in Australia or the world, and 2) urchin predators, such as large eastern rock lobsters, blue groper, and pink snapper, have all demonstrated historical declines across New South Wales.[6]

2.10 Given this debate, some have called for urchin culling and programs to rehabilitate barrens.[7] However, others consider barrens an integral part of NSW's ecological biodiversity.[8] For example, Professor Michael Kingsford noted:

> The extent to which the abundance of these urchins on New South Wales rocky reefs is a natural phenomenon or reflect change due to human impacts

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3 DCCEEW, *Submission 32*, p. 2.

4 Professor Maria Byrne, *Submission 23*, p. 2.

5 See Professor Michael Kingsford, *Submission 11*, pp. 4–5; Professor Adriana Vergés, Professor Peter Steinberg and Dr Ezequiel Marzinelli, *Submission 21*, p. 3; and Mr Jeremy Day, *Submission 22*, pp. 2–3; Professor Maria Byrne, *Submission 23*, p. 2.

6 Blue Carbon Services, *Submission 41*, p. 4.

7 See Professor Adriana Vergés, Professor Peter Steinberg and Dr Ezequiel Marzinelli, *Submission 21*, p. 4; Blue Carbon Services, *Submission 41*, pp. 4–5.

8 Australian Marine Sciences Association (AMSA), *Submission 8*, p. 2; and Professor Michael Kingsford, *Submission 11*, p. 2; Mr Jeremy Day, *Submission 22*, p. 2; and Professor Symon Dworjanyn, *Submission 26*, p. 1.

> on reef ecology has been a focus of media and policy, but extensive research points to the former. In NSW this species is critical for the diversity of reef based habitats to the south of Port Stephens. Rocky reefs are one of the most common and spectacular environments along the coast of New South Wales. Critically, habitat diversity plays a key role in the functioning of these reefs. The seascape is characterized by a mosaic of habitats, including shallow cunjevoi… and tufting algae, while in deeper waters kelp forest and urchin grazed barrens abound.[9]

2.11 Mr David Rowland of the Nature Coast Marine Group noted that urchin barrens were a 'global problem', and suggested the debate in NSW could be characterised as 'whether these urchin barrens are natural or whether they're caused by overfishing of urchin predators—by colonial settlement and afterwards—just by heavy fishing'. Noting a very large barren of around seven kilometres long in NSW, he suggested further research was needed:

> What you're left with is that bedrock, which is basically whitish rock. There hasn't been much mapping into deeper water. A lot of the mapping is just what you can see from aerial photos. So that's a big gap. They're finding them very deep in Tassie, down to 40 or 50 metres. The work just hasn't been done here to see if that's happening … Truly over time there have been smaller barrens, but to have such huge, extensive barrens is possibly unlikely in a natural scenario. So the question is: have we removed our predators? What predators have been removed?[10]

2.12 At a hearing, Mr Dane Wilmott, the President of the Nature Coast Marine Group, told the committee that:

> … a barren perhaps has its own unique ecosystem and biodiversity in its own right. Once again, it's spatial reference: how much of that unique biodiversity is needed and how does that unique biodiversity—that is, a barren—benefit the majority of the stakeholders? It may benefit and may well be in a natural state in its own right, but if you're looking at it from an ecotourism perspective it doesn't benefit people who don't want to look at bare rock and a few small fish. It doesn't benefit the sea urchin fishery. It doesn't benefit the abalone fishery. It doesn't represent or benefit cultural fishing practices or recreational fishing practices.[11]

2.13 Some submitters noted that the presence of Centro in NSW has decreased the productivity of abalone fisheries in the state. Sea urchins are also commercially harvested in NSW.[12]

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9 Professor Michael Kingsford, *Submission 11*, p. 2.

10 Mr David Rowland, Nature Coast Marine Group, *Committee Hansard*, 7 June 2023, p. 19.

11 Mr Dane Wilmott, President, Nature Coast Marine Group, *Committee Hansard*, 7 June 2023, p. 22.

12 See, for example, evidence presented on the abalone and urchin industries by: Abalone Association of New South Wales, *Submission 1*, pp. 2 and 1–4; Sea Urchin Harvest, *Submission 15*, p. 3; Professor Adriana Vergés, Professor Peter Steinberg and Dr Ezequiel Marzinelli, *Submission 21*, p. 3.

2.14 On potential strategies to reduce Centro populations, some evidence argued that work to reduce urchin populations in NSW would not necessarily correspond to a reduction of populations further down the coastline, due to larval dispersion and already established colonies in other states. [13]

NSW's approach to management

2.15 The NSW Department of Primary Industries (Fisheries) (NSW DPI) explained that NSW's priorities were to maintain competitiveness and productivity for NSW fisheries, while working with other states to research, develop and manage Centro's spread. Dr Thor Saunders, Director of Fisheries Research for the NSW DPI stated:

> The long-spined sea urchin, colloquially known as centro, is a naturally occurring invertebrate species in New South Wales rocky reef ecosystems. It's the species with the highest catch. It was 83 per cent in 2020 in the New South Wales sea urchin and [inaudible] restricted fishery. That has been operating sustainably in New South Wales for over 50 years. [NSW DPI] strongly supports efforts to sustainably harvest centro and assist with the development of domestic and export markets for this species.[14]

2.16 Dr Saunders commented that, even if urchin barrens were understood as a natural and established part of NSW's ecology, the state was committed to working collaboratively across jurisdictions to address the wider challenge of Centro:

> Unlike in Victoria and Tasmania, there is currently no scientific evidence that there are broad-scale patterns of urchin barrens increasing in New South Wales. However, we understand that centro abundance in south-eastern Australia has the potential to significantly negatively impact rocky reef ecosystems in this region. Currently we are participating in a centro tri-state task force that was formed in February 2023 that aims to evolve jurisdiction-specific and cross-jurisdictional regional management and research and supply chain priorities for this species.[15]

2.17 Dr Saunders also listed emerging priorities for managing Centro, including:

> … development of best-practice management for the fishery in the form of a harvest strategy. This will initially cover New South Wales, but we will also be in discussions with Tasmania and Victoria to develop a regional

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[13] See, for example, evidence provided by: Dr Paul Carnell, Research Fellow, Blue Carbon Lab, Deakin University; and Professor Stephen Swearer, Professor of Marine Biology, University of Melbourne; and Director, National Centre for Coasts and Climate, *Committee Hansard,* 6 June 2023, pp. 19 and 20 respectively.

[14] Dr Thor Saunders, Director Fisheries Research, NSW Department of Primary Industries (NSW DPI), *Committee Hansard*, 7 June 2023, p. 34.

[15] Dr Thor Saunders, NSW DPI, *Committee Hansard*, 7 June 2023, p. 34.

> tri-state harvest strategy to guide management and harvest in these fisheries.[16]

2.18 It was recognised that questions remain about Centro's role in NSW's marine ecology, and that Traditional Owners could provide deep knowledge about urchin populations. Dr Saunders stated:

> Development of a survey methodology in cooperation with stakeholders—not just stakeholders; as we heard from Wally [Stewart], Traditional Owners—is being used to underpin the sustainable management of centro as well as identifying ecological benefits from the removal of this species. We work collaboratively with commercial and Aboriginal fishers to ensure that the objectives of these groups are being achieved.[17]

2.19 Professor Adriana Vergés and colleagues from the University of New South Wales submitted that Traditional Owners had unique perspectives that could inform Centro management approaches:

> Perspectives from First Nations communities who have millennial links to NSW Sea Country provide highly valuable insights into such long-term changes. In a document entitled 'Sea Country Health & Connection on the NSW South Coast' the NSW Aboriginal Fishing Rights Group collected 70 survey responses from First Nation owners with over 50% of surveyed participants being part of the NSW South Coast Native Title Claim. 71% of respondents indicated that "sea urchins are a key cause of sea country degradation", including the long term loss of kelp forests.[18]

2.20 Mr Wally Stewart, NSW South Coast Traditional Owner and an Advocate for NSW Aboriginal Fishing Rights Group, confirmed there had been positive engagement between First Nations and the DPI, and that the state government had supported both research into the long-term history of the state's marine ecology, as well as Traditional Owners being trained to undertake sustainable management of marine ecosystems.[19]

Victoria

2.21 The southwards migration of Centro has created significant challenges in Victoria. While the urchin has had some presence historically, the last two decades have seen a significant increase in populations and barrens, which has impacted on fishing industries and communities. Mr Dale Winward of the Mallacoota Sea Urchin Divers Association outlined the recent upsurge:

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16 Dr Thor Saunders, NSW DPI, *Committee Hansard*, 7 June 2023, p. 34.

17 Dr Thor Saunders, NSW DPI, *Committee Hansard*, 7 June 2023, p. 34.

18 Professor Adriana Vergés, Dr Ezequiel Marzinelli, and Professor Peter Steinberg, University of New South Wales, *Submission 21*, p. 4.

19 Mr Wally Stewart, NSW South Coast Traditional Owner; Advocate, NSW Aboriginal Fishing Rights Group, *Committee Hansard*, 7 June 2023, p. 34. See also information on these programs in Chapter 3.

> They're a native species in Victoria … I've dived for abalone for 30 years, as well as sea urchins … When I first started diving [at a township called Marlo], in the first 15 years of my diving career you never used to see the centros down there at all because the water was too cold for them. Then you started seeing little pockets here and there and all of a sudden those pockets just expanded. So they've always been there, but as the eastern seaboard currents are getting warmer the sea urchins are proliferating with the warmer currents.[20]

2.22 Professor Stephen Swearer, Professor of Marine Biology at the University of Melbourne and Director of the National Centre for Coasts and Climate, suggested that warming waters and other factors have led to unsustainable levels of Centro in Victorian waters:

> [T]here have been high densities of native urchins, including long-spined urchins, for quite some time. But it's only been in recent decades, likely due to a range of other factors, including changes in nutrient availability and climate change, that declines in seaweed productivity have not been able to keep up with urchin grazing pressure. This has led to an increase in the loss of macroalgal beds, in the case of the fishery zone and in terms of abalone productivity, through the formation of urchin barrens.[21]

2.23 Parks Victoria confirmed that Centro had become overabundant and created a serious environmental management issue:

> In eastern Victoria Black-spined Urchins (*Centrostephanus rodgersii*) have created extensive barrens on reefs within parks within as well as on many other reefs outside parks in the region (Beware Reef Marine Sanctuary and Cape Howe Marine National Park). Purple Urchins (*Heliocidaris erythrogramma*) have caused extensive loss of kelp communities within the three Port Phillip Bay Marine Sanctuaries (Ricketts Point, Jawbone, and Point Cooke Marine Sanctuaries) and seagrass beds (*Posidonia australis*) in south Gippsland's Nooramunga Marine and Coastal Park.[22]

2.24 Parks Victoria added that the 'loss of suitable kelp or seagrass habitat within Victoria's marine protected areas due to overgrazing of urchins is recognised as a major threat to maintaining marine biodiversity within these parks'.[23]

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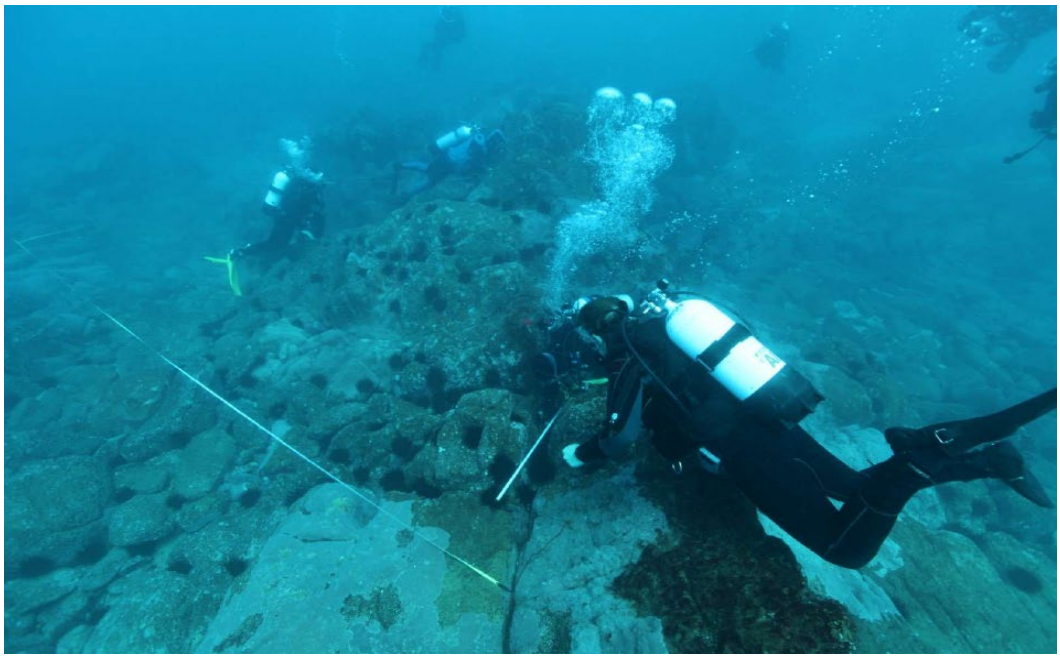
[20] Mr Dale Winward, Mallacoota Sea Urchin Divers Association, *Committee Hansard*, 6 June 2023, p. 4.

[21] Professor Stephen Swearer, Professor of Marine Biology, University of Melbourne, and Director, National Centre for Coasts and Climate, *Committee Hansard*, 6 June 2023, p. 15.

[22] Parks Victoria, *Submission 6*, p. 1.

[23] Parks Victoria, *Submission 6*, p. 1. See below for a discussion of the federal listing of Giant Kelp Forests as an endangered ecological community.

Figure 2.4 Urchin culling at Beware Reef Marine Sanctuary, Victoria



Source: Mike Irvine (via Parks Victoria, Submission 6, p. 2).

2.25 Regarding effects on business and industry, the most significant economic impact of Centro's expansion into Victorian waters has been on the abalone industry. The Eastern Zone Abalone Industry Association and Victorian Sea Urchin Divers' Association submitted that the range expansion of Centro has resulted in 'denudation of algal communities [that] has severely impacted the health of many reef habitats, not only reducing biodiversity but also the productivity of the commercial abalone fishery'.[24]

2.26 Hayes Seafood likewise reported that the current proliferation of urchins in the state had resulted in 'over 10 years of consecutive quota cuts and a loss of quota by over a quarter' for abalone divers, despite some Centro culling activities.[25]

2.27 Conversely, the spread of Centro has created some economic opportunities, which are discussed in Chapter 3. In Victoria, some former abalone fishers have moved into the commercial processing of Centro roe for export, which has partially reduced the urchin population. Sea Urchin Harvest submitted:

> Targeted sea urchin fishery arrangements can address the excessive population of long spined urchin and the resultant impact on ecosystem integrity and function. Jobs growth and export potential would be assured in addition to a return to health of high value fisheries such as abalone,

[24] Eastern Zone Abalone Industry Association and Victorian Sea Urchin Divers' Association, *Submission 4*, p. 1.

[25] Hayes Seafood, *Submission 2*, p. 1.

> lobster and to other fisheries and potentially reduce long spined larvae entering the East Australian Current and continue into Tasmanian waters.[26]

2.28 Sea Urchin Harvest further noted that no-take regions in NSW and Victorian marine parks and sanctuary zones were allowing Centro to flourish, and subsequently recommended a change to licensing arrangements in these zones.[27]

2.29 The Victorian Government drew the committee's attention to a five-hectare regeneration program at Beware Reef, which had delivered a return of at least seven to one:

> **Mr Irving:** For the five hectares that we've treated at Beware Reef it's cost us about $100,000 over the last four years. The cost-benefit analysis that was done shows about a one to seven return. So, a positive, and that doesn't include any fisheries values, because it's a marine protected area; there's no take. So, purely biodiversity values and nitrogen and carbon values would be higher.
>
> **Mr Sams:** I would also add that it's a very conservative estimate, too, because it only looks at two species of kelp and a limited number of things that we know we can put a dollar value on. So, not other things that were a little bit less tangible to put a dollar value on as well.[28]

Victoria's approach to management

2.30 Representatives of the Victorian Government noted the significant environmental challenge for the state as well as the threat to marine industries. Dr Kate Watermeyer, a Project Officer in the Marine Knowledge Team, Department of Energy, Environment and Climate Action, Victoria (DEECA), noted that the Victorian Government regarded Centro as a long-term challenge, given projections for climate change and rising urchin populations:

> Modelling that we've commissioned shows that, under climate change scenarios, urchins will increase significantly by 2090 and also there'll be a loss of kelp across 60 to 94 per cent of its range. It emphasises that it's really important we address this issue as a priority in Victoria.
>
> The Victorian government has invested more than $2 million since 2018 into research and activities focusing on urchin management in Victoria … DEECA supports the need for coordinated strategic investments and research to develop management approaches and tools for successful ongoing management across the affected regions.[29]

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26 Sea Urchin Harvest, *Submission 15*, p. 4.

27 Sea Urchin Harvest, *Submission 15*, p. 4.

28 Mr Michael Irvine, Ranger Team Leader, Parks Victoria; and Mr Michael Sams, Manager, Marine and Coastal Sciences and Programs, Parks Victoria, both in *Committee Hansard*, 6 June 2023, p. 42.

29 Dr Kate Watermeyer, Project Officer, Marine Knowledge Team, Department of Energy, Environment and Climate Action (DEECA), Victoria, *Committee Hansard*, 6 June 2023, p. 33.

2.31 Mr Travis Dowling, the Chief Executive Officer of the Victorian Fisheries Authority (VFA), stated:

> … in Victoria, from a fisheries point of view, we currently have, again, an abundant centro fishery. We have no processors operating in Victoria as such. We have people that want to get into the fishery. We estimate we've got a 45,000-tonne biomass that we're harvesting less than 100 tonne a year on. Whilst that biomass may only have 5,000 tonne of valuable urchin as part of that full biomass, our harvest is at 100 tonnes a year and we need to lift that harvest rate...We are providing incentives for the fishers to take more of the catch. We're looking at some further options like providing more permits to get more fishers into the fishery, to remove any regulatory impediment there may be to a greater fish-down of the current biomass, and really incentivise the existing fishers.[30]

2.32 Parks Victoria outlined the significant activities it has been undertaking to address Centro's range spread into the marine parks and sanctuaries it manages:

> Loss of suitable kelp or seagrass habitat within Victoria's marine protected areas due to overgrazing of urchins is recognised as a major threat to maintaining marine biodiversity within these parks. Parks Victoria has worked with research partners and community organisations to manage impacts where possible and actively restore habitat through culling of urchins within parks.[31]

2.33 Parks Victoria highlighted a recent program that successfully reduced urchin density by 90 per cent in the program area.[32] Parks Victoria noted that such intervention activities could also prevent knock-on ecological impacts in nearby areas, stating:

> Our management of urchins at Beware Reef Marine Sanctuary and within Port Phillips Marine Sanctuaries is primarily aimed at restoring kelp from locations where it has been lost due to overgrazing whilst also seeking to limit spread [of Centro] and further loss of kelp. In Nooramunga Marine and Coastal Park urchin culling has been undertaken primarily to prevent expansion of barrens within the Posidonia seagrass meadows whilst also allowing for restoration of seagrass.[33]

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30 Mr Travis Dowling, Chief Executive Officer, Victorian Fisheries Authority, *Committee Hansard*, 6 June 2023, p. 33.

31 Parks Victoria, *Submission 6*, p. 1.

32 Parks Victoria, *Submission 6*, pp. 7–10. Following the increase of Centro in the area from 2010 onwards, the Victorian Government—in collaboration with the Friends of Beware Reef Organisation, the University of Melbourne and Deakin University—undertook major culling activities in 2019, which resulted in significant outcomes despite the project having to be halted during 2021 due to COVID-19 restrictions. Despite the earlier finish date for culling activities, Parks Victoria noted that 'urchin numbers indicated these stayed close to the projected densities for kelp recovery' (Parks Victoria, *Submission 6*, pp. 7–9).

33 Parks Victoria, *Submission 6*, p. 15.

2.34 In addition to direct culling programs, Parks Victoria has undertaken partnerships with Traditional Owners, community organisations and commercial fishers, as well as supporting citizen science programs and other volunteer activities to help manage Centro.[34] Its submission outlined a number of successful programs, and highlighted a potential barrier for First Nations Centro management:

> As a component of urchin management in Nooramunga Marine and Coastal Park opportunities to engage Gunaikurnai Land and Waters Aboriginal Corporation in urchin management and monitoring were identified and an invitation to contribute extended.
>
> Gunaikurnai people have occupied, used, and managed coastal land and sea environments for many thousands of years [including] those areas that were dry land before the current sea level stabilised about 5,000 years ago.
>
> A barrier to participation in urchin programs was inwater skills of Gunaikurnai Rangers so Parks Victoria's marine staff delivered a training program in snorkelling and underwater monitoring. This program was an important first step towards active involvement in future programs across Gunaikurnai sea country.[35]

2.35 Representatives of the Victorian Government supported participation of First Nations communities in the Centro Task Force to address the complexity of Centro range expansion.[36]

Tasmania

2.36 Centro has been present in Tasmanian waters for over four decades, but recent years have seen rapid expansion, with numbers growing from an estimated 11 million in 2002, to an estimated 20 million in 2017.[37]

2.37 In its submission, the Tasmanian Government reported that the spread of Centro into Tasmanian waters has already 'had a very significant impact on the ecological integrity and functioning of Tasmania's East Coast rocky reef ecosystems and on the social and economic values and productivity of cultural, recreational and commercial fisheries'.[38] The Tasmanian Government noted that,

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34 Parks Victoria, *Submission 6*, pp. 11–13.

35 Parks Victoria, *Submission 6*, p. 12.

36 Dr Kate Watermeyer, DEECA; and Mr Travis Dowling, Victorian Fisheries Authority, both in *Committee Hansard*, 6 June 2023, pp. 33–34.

37 Tasmanian Government, *Submission 30*, p. 2; Great Southern Reef Foundation, *Submission 35*, p. 2; and Institute for Marine and Antarctic Studies (IMAS), *Submission 38*, p. 2. See also Scott Ling and John Keane, *Resurvey of the longspined sea urchin (Centrostephanus rodgersii) and associated barren reef in Tasmania*, IMAS, December 2018, pp. 41–42.

38 Tasmanian Government, *Submission 30*, p. 2.

thus far, Tasmania has lost more than 15 per cent of its rocky reef habitats and more than 95 per cent of its kelp forests.[39]

2.38 The University of Tasmania's Institute for Marine and Antarctic Studies (IMAS), a leading research body for Centro, further stated that 'modelled projections of observed rates of population increase and overgrazing indicate that unless there is meaningful response to this threat, half of all reefs in eastern Tasmania are likely to become urchin barren grounds by mid-2030s'.[40]

2.39 The Great Southern Reef Foundation emphasised the ecological and social importance of the Great Southern Reef, which is a temperate reef that spans over 8000 kilometres from mid-Western Australia to northern NSW and around Tasmania. The Foundation stated:

> The Great Southern Reef is a global biodiversity hotspot of which around ~75% of species are not found anywhere else … The eastern Great Southern Reef, spanning NSW, Victoria and eastern Tasmania epitomises the national character of the Great Southern Reef. The concentration of large cities to small regional towns along this ~2000km section of shoreline, important reef-based industries (e.g. rock lobster and abalone fisheries) and immense biodiversity and natural value make the Great Southern Reef an iconic and critically important natural asset.[41]

2.40 Kelp forests are critical to the health of the Great Southern Reef, as well as the Tasmanian marine environment more generally. The Australian Marine Conservation Society stated that 'the loss of kelp forest across the Great Southern Reef, particularly the [giant kelp] communities found in southeastern Australia, has already resulted in a devastating loss of biodiversity, social and cultural values, and millions of dollars and at least several hundred tons of annual local seafood production'.[42]

2.41 In noting the endangered listing of the Giant Kelp Forests of South East Australia under federal environment laws, the Invasive Species Council outlined the particular challenge for Tasmania:

> Over the past 60 years, wind systems strengthened by ozone depletion and climate change have pushed the East Australian Current about 350 km further south, increasing sea surface temperatures and salinity along the eastern Tasmania coast. The temperature increase is trending at 2.3°C a century, the highest in the Southern Hemisphere and three times the average rate of warming in the world's oceans.

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39 Tasmanian Government, *Submission 30*, p. 2. See also IMAS, *Submission 38*, p. 2 and p. 13.

40 IMAS, *Submission 38*, p. 4. Note, this could potentially correspond to urchin barrens of the size and extent of those observed in NSW, as outlined above.

41 Great Southern Reef Foundation, *Submission 35*, p. 2.

42 Australian Marine Conservation Society (AMCS), *Submission 37*, p. 11.

> The East Australian Current brings warm, nutrient-poor water from the Coral Sea and kelp-munching black sea urchins (*Centrostephanus rodgersii*) from NSW, where they are native. The warming is detrimental for giant sea kelp and helps sea urchins establish, by increasing temperatures above the 12°C threshold they need for reproduction.[43]

2.42 Regarding the economic impact of Centro's range extension, the spread of the urchin has already had a profound impact on Tasmania's fishing industries.

2.43 A joint submission by the Tasmanian Seafood Industry Council, the Tasmanian Commercial Divers Association, the Tasmanian Abalone Council Limited and the Tasmanian Rock Lobster Fishermen's Association described the damage caused by Centro as 'threatening the viability of a number of fisheries'. The submission noted 'an urgent need to better control abundances of the range extending Long-Spined Sea Urchin'.[44]

2.44 At a hearing, Mr Darvin Hansen, Managing Director, Tasmanian Seafoods Group, suggested that addressing Centro and restoring a healthy reef ecosystem could translate to around $25 million a year in increased yield for abalone harvest alone.[45]

2.45 The overgrazing of kelp forests by Centro is extremely damaging for the abalone industry in particular. As an example, the Tasmanian Government highlighted the 98 per cent reduction in the commercial abalone harvest:

> As one measure of impact, the commercial abalone fishery on the East Coast of Tasmania supported an annual harvest of around 1,000 tonnes prior to the establishment of Centro in Tasmanian waters. The same fishery is now limited to around 20 tonnes in this area. That reduction is directly correlated with the loss of abalone habitat caused by urchin grazing.[46]

2.46 The Tasmanian Seafoods Group highlighted the importance of combatting Centro's spread, describing its impact as 'catastrophic for industry':

> It is important that the problem of [Centro] barrens and fish stock depletion is addressed via Centro removal and habitat restoration, as this has the

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43 Invasive Species Council, *Invasive sea urchin endangers giant kelp forests*, 6 September 2012 (accessed 2 November 2023).

44 Tasmanian Seafood Industry Council, Tasmanian Commercial Divers Association, Tasmanian Abalone Council Limited and Tasmanian Rock Lobster Fishermen's Association, *Submission 39*, pp. 3 and 5.

45 Mr Darvin Hansen, Managing Director, Tasmanian Seafoods Group, *Committee Hansard*, 3 February 2023, p. 16.

46 Tasmanian Government, *Submission 30*, p. 3. The decline in commercial abalone catch is also clear in *Tasmanian Wild Fisheries Assessments* figures for 2000-2020 (accessed 2 November 2023). See also Eastern Zone Abalone Industry Association and Victorian Sea Urchin Divers Association, *Submission 4*, p. 2, for similar problems in a Victorian context.

> potential to impact CITES[47] listing of Australian seafood species, which increases risk of export revocation that can be financially catastrophic to export-based fisheries such as abalone, rock lobster, and many other species, even in non-impacted jurisdictions.[48]

2.47 Commenting on the net impact across various fisheries, IMAS outlined the overall risk that Centro overgrazing poses to Tasmanian fishing industries:

> The flow-on impacts of kelp bed overgrazing by this urchin are dramatic, with local loss of over 150 species that live amongst Tasmanian kelp beds (Ling 2008), which threatens parts of the lucrative fisheries for Blacklip Abalone (*Haliotis rubra*; total annual gross value of production ~$80 million) and Southern Rock Lobster (*Jasus edwardsii*; total annual gross value of production ~$100 million) ...[49]

Tasmania's approach to management

2.48 The Tasmanian Government has developed the Long Spined Sea Urchin Strategy, which seeks to combat Centro in Tasmanian waters. The strategy aims to engage commercial dive fisheries, the recreational dive community and other organisations to assist the Tasmanian Government to:

- Stop new urchin barrens forming;
- Reduce growth of existing urchin barrens; and
- Reverse and rehabilitate existing urchin barrens.[50]

2.49 Alongside this strategy, the Tasmanian Government has co-funded the $5.1 million Abalone Industry Reinvestment Fund (AIRF), which was due to conclude on 30 June 2023. However, the fund was extended for a further two years and provided with an additional $2 million in funding. The AIRF—a partnership between the Tasmanian Government, Tasmanian Abalone Council, Tasmanian Commercial Divers Association, seafood processors, IMAS, CSIRO, and Natural Resource Management (NRM) South—has 'led to an extensive and ongoing program of urchin control, and subsequent removal of more than

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47 That is, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In elaborating on the risk of delisting, the Tasmanian Seafoods Group stated '… fisheries in Australia such as abalone that span several states, have a risk of being CITES listed. Once a species is CITES listed, all fisheries in each state must obtain a positive Non-Detrimental Finding (NDF) to export. This decision is not up to the state-based Fisheries Management, it becomes a Federal responsibility.

'So, to the extent that the spread and incursion of Centro causes depletion and in turns threatens species, this will increase the likelihood of CITES listing and concomitant financial risk and difficulties in export dominated species such as abalone and rock lobster. Once a species is CITES listed it will be a problem for every state in Australia with such a fishery, Centro-impacted or otherwise.' See Tasmanian Seafoods Group, *Submission 40*, p. 12.

48 Tasmanian Seafoods Group, *Submission 40*, p. 2.

49 IMAS, *Submission 38*, p. 5.

50 Fishing Tasmania, *Long Spined Sea Urchin Strategy* (accessed 2 November 2023).

2,400 tonnes of urchins since 2018'.[51] The AIRF also conducts research and monitoring activities, as well as seeking to improve industry and public education.[52]

2.50 Dr Ian Dutton, the General Manager of Marine Resources, in the Department of Natural Resources and Environment Tasmania, outlined the successes of the AIRF:

> The fund itself was $5.1 million, and it's divided into two parts. One has to do with abalone enhancement, which has been a sort of related but separate program. The other part has to do with centro control. So effectively the centro control part works out to just over half a million dollars a year. But it has been pivotal … in scaling up our production. The graph that we had in our submission [p. 5] showed that we had done some harvesting of bits and pieces back to about 2009 at the level of about 7,000 kilograms [of Centro] per year. Since that program has come in, we've been harvesting about 500 tonnes per year. So it's been a very significant impact on the total biomass, particularly in certain areas.
>
> Going back to your question, there are many beneficiaries from that effort. There's a lot of interest not only from fisheries—whether they're rock lobster or even other scale fisheries who have fisheries that are reef dependent, which would include recreational fishers—but also from dive tourism operators, tourists themselves and Aboriginal cultural fishers, who all benefit from that better habitat. Hence our submission has really focused on the stewardship benefits of a more integrated control program for all sectors.[53]

2.51 Submitters recognised the need for First Nations communities and Traditional Owners to be involved in research and management of marine resources. Dr Fiona Valesini, Director of the Oceans Program of the Nature Conservancy Australia, set out the importance of indigenous involvement, noting programs such as truwana Rangers in Tasmania:

> I think there's a fair amount of feeling a bit excluded and perhaps not trusted to lead the space [from First Nations communities]. So I think that, in the co-design model that we were talking about before, really harnessing knowledge and opportunities and skill sets across community—of course, including Indigenous community—is very important here. We heard a lot at the [February 2023 Centro] workshop … about bringing these two basic knowledge sets together—scientific knowledge, which has been built up primarily over the last 20 or maybe 30 years, but then also Indigenous history, which has watched this habitat evolve and change and alter resources that are available, and just the loss of sea country. We saw some great initiatives from local Indigenous

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[51] Tasmanian Government, *Submission 30*, p. 2. See also Tasmanian Government, *Abalone Industry Reinvestment Fund* (accessed 2 November 2023).

[52] Tasmanian Government, *Submission 30*, p. 3.

[53] Dr Ian Dutton, General Manager—Marine Resources, Department of Natural Resources and Environment Tasmania, Tasmania, *Committee Hansard*, 3 February 2023, p. 61.

> groups—truwana is one example—training up local sea rangers to get scientific diving qualifications to do monitoring and look after their own sea country'.[54]

South Australia

2.52 No evidence considered by the committee noted the presence of Centro in South Australia.

2.53 However, the Centro Task Force provided the following information to the committee:

> At the moment, the ocean currents mean that larval dispersal of Centro to SA is highly unlikely… but there are predictions of changing ocean currents, and this is why people are starting to talk about possible SA colonisation.
>
> Centro has been a topic of discussion within the [Australian Society for Fish Biology] Fisheries Management Committee, which comprises fishery manager reps from every state and NZ—the only knowledge and concern in that forum has come from Tas, Vic, and NSW. There aren't any public logs of it in SA on Redmap either.[55]

2.54 The submission of the Department of Primary Industries and Regions in South Australia observed that there is a 'growing interest in traditional aquaculture species such as Sea Urchins which are culturally important to First Nations communities'. It was noted that certain urchin species will only be considered for cultivation in 'grow-out in closed land-based systems in South Australia', in order to 'manage the risk of barren formation resulting from marine pest invasion'.[56]

New Zealand

2.55 Centro is considered as an emerging risk by the New Zealand (NZ) Government and research sector. A submission by Dr Nick Shears, Celia Balemi and Kelsey Miller from the Institute of Marine Science at the University of Auckland, set out these concerns:

> As in Tasmania, populations of [Centro] in northern New Zealand are increasing and connected to eastern Australian populations by larval dispersal. Ocean warming has been less severe in northern NZ than in Tasmania and we are just starting to observe increases in [Centro] and understand their impacts on the natural biodiversity of our reef ecosystems. The New Zealand Government is only just becoming aware of this emerging issue and moves are in place to explore management options. Our concern is that management efforts to control [Centro] in New Zealand will be futile without management action to greatly reduce the size of upstream populations in Australia. We therefore strongly support management

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54 Dr Fiona Valesini, Director, Oceans Program of the Nature Conservancy Australia, *Committee Hansard*, 3 February 2023, p. 50.

55 Email from the Centro Task Force, received 5 September 2023.

56 Department of Primary Industries and Regions (South Australia), *Submission 7*, p. 1.

> efforts to control [Centro] to aid in preventing further expansion of populations in New Zealand.[57]

Commonwealth's role in environmental protection, management and research

2.56 Within Australia, biodiversity protection and conservation arrangements are governed by the Commonwealth, as well as state and territory governments.

2.57 The Commonwealth's primary role is to regulate 'matters of national environmental significance' such as nationally and internationally important flora, fauna and ecological communities. The Commonwealth also provides 'national coordination through overarching strategies and species-specific or site-specific plans'.[58] State and territory governments, on the other hand, are responsible for regulating environmental matters in their respective jurisdictions.

Environment protection

2.58 DCCEEW is responsible for administering the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which 'provides a legal framework to identify, protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places'.[59] The department described its role as delivering:

> … on the Australian Government's obligations for the protection of environmental matters related to threatened species and ecological communities through the operation of the EPBC Act and also delivers non-statutory measures such as programs that invest in recovery, restoration, monitoring, and science for the protection and conservation of biodiversity.[60]

Protecting ecological communities and habitat

2.59 DCCEEW's submission notes that the Great Southern Reef is not defined or protected under the EPBC Act and so 'management strategies are targeted towards specific ecological, social and economic issues and threats'.[61]

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57 Dr Nick Shears, Celia Balemi and Kelsey Miller, Institute of Marine Science, University of Auckland, *Submission 31*, p. 1.

58 DCCEEW *Submission 32*, pp. 1–2.

59 DCCEEW, *Submission 32*, p. 1.

60 DCCEEW, *Submission 32*, p. 1.

61 DCCEEW, *Submission 32*, p. 2. In discussing the Great Southern Reef not being directly referred to in the EPBC Act, the DCCEEW cites the work of Bennett et al, which argues that 'the absence of a recognised identity for these temperate reefs (similar to that of the 'Great Barrier Reef') contributes to a lack of appreciation of their ecological, social and economic importance' (DCCEEW, *Submission 32*, p. 2; see also Scott Bennett , Thomas Wernberg, Sean Connell, Alistair Hobday, Craig Johnson and Elvira Poloczanska, 'The Great Southern Reef: social, ecological and economic

2.60 However, the Giant Kelp Forests of South East Australia were listed as an endangered ecological community under Commonwealth environment laws in 2012, the first time that a marine ecology was listed under these laws.[62]

2.61 Despite the Threatened Species Scientific Committee recommending in 2012 that a recovery plan be prepared for the giant kelp ecological community, the former Environment Minister, the Hon Sussan Ley MP, decided in March 2022 not to proceed with a recovery plan.[63]

2.62 Instead, the DCCEEW submitted that an Approved Conservation Advice for the giant kelp ecological community is in effect and 'provides information about priority research areas and actions to mitigate key threats':

> The most significant threatening process to the Great Southern Reef and the giant kelp ecological community is climate change. For the giant kelp ecological community, the Conservation Advice provides guidance on actions that respond to secondary threats such as … removal of urchin predators.[64]

2.63 In its submission the Australian Marine Conservation Society (AMCS) raised concerns with this more limited form of protection:

> A decade later [after the 2012 listing], no recovery plan [as distinct from a conservation advice] is in place to guide managers and industry in addressing their impacts and obligations under the [EPBC] Act to support recovery [of the listed giant kelp ecological community]. It is important to acknowledge that the Act is failing to protect the community despite this listing. There are serious concerns that the *EPBC Act 1999* is not fit for purpose, and is not working to protect or recover species or communities listed. Reform of the Act is critical, as is significant investment in protection and restoration of species and communities that are listed under it.[65]

2.64 This sentiment was echoed by Ms Jane Gallichan of the Tasmanian Association for Recreational Fishing who told the committee that in 2022:

> … there was no strategy to address either centro or kelp reforestation at that time. Giant kelp was listed as an endangered community in 2012 under the EPBC Act. Today there is still no recovery strategy. Tasmanians have

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value of Australia's neglected kelp forests', *Marine and Freshwater Research*, vol. 67, 2015, pp. 47–56. The Tasmanian Government also noted the lack of federal priority afforded to the Great Southern Reef in comparison to the Great Barrier Reef in Tasmanian Government, *Submission 30*, p. 2.

62 See the listing on the DCCEEW's Species Profile and Threats (SPRAT) Database, *Giant Kelp Marine Forests of South Eastern Australia* (accessed 2 November 2023).

63 Dr Fiona Fraser, Threatened Species Commissioner, DCCEEW, *Committee Hansard*, 7 June 2023, pp. 53–54.

64 DCCEEW, *Submission 32*, p. 3.

65 Australian Marine Conservation Society (AMCS), *Submission 37*, p. 9.

> warned, and we would agree, that centro barrens are extending along the east coast.[66]

2.65 More recently, the giant kelp ecological community in Tasmanian waters has been identified as a 'priority place' in the Australian Government's October 2022 *Threatened Species Action Plan 2022–32* (TSAP). It is the 'only truly marine priority place that was identified' in the TSAP.[67]

2.66 Such priority places are identified as areas where the Australia Government intends to undertake 'research, support and recovery action'. A key TSAP target for 2027 is for all priority places to be 'on track to have improved condition'.[68] The TSAP outlines future activities:

> During early 2023, a profile for each priority place will be developed that describes key natural values for its threatened species and threatened ecological communities. Place profiles will identify important areas for support and recovery that the Action Plan will focus on, including goals to meet to improve the place's condition and the actions needed to achieve these. Actions will be specific for each place and may include elimination of particular invasive pests or weeds, implementation of First Nations ecological management practices, habitat restoration and/or augmentation and research to inform actions.
>
> Support for these actions will be prioritised through relevant Australian Government policies and programs. State and territory governments, First Nations peoples, natural resource managers, land and sea managers and community groups will be encouraged to partner with us in working towards these goals. Our combined achievements will be measured in 2027 to determine if the Action Plan's objectives are being met.[69]

2.67 In June 2023, Dr Fiona Fraser, Threatened Species Commissioner, DCCEEW, elaborated on this 'priority place' designation of the giant kelp ecological community:

> What we're doing for all of our priority places … is establishing a baseline condition, working on information that we've got for each of those places and the key threats where we think we could make a material difference in the next five years. We are intending to direct funding from our Natural Heritage Trust, and decisions around that funding are in play at the moment, and the Saving Native Species program. We're very familiar with the work that's taken place to date on threats to giant kelp and the need for ex situ conservation measures and advances there with hatcheries and further understanding on thermal tolerance of different strains of those species and restoration, and then the removal or the management of threats

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66 Ms Jane Gallichan, Chief Executive Officer, Tasmanian Association for Recreational Fishing Inc. *Committee Hansard*, 6 June 2023, p. 23.

67 Dr Fiona Fraser, Threatened Species Commissioner, DCCEEW, *Committee Hansard*, 7 June 2023, p. 54.

68 DCCEEW, *Threatened Species Action Plan 2022-32* (October 2022), p. 2.

69 DCCEEW, *Threatened Species Action Plan 2022-32* (October 2022), p. 45.

> in situ, such as *Centrostephanus*. We're also familiar with the key partners who we would need to engage with in that work, given it's such a unique and discrete priority place to focus on ... So I would expect that over coming months we will be working with those partners once we've got our baseline for our priority places, and we'll look to be undertaking some comprehensive recovery work for that particular priority place.[70]

2.68 Dr Fraser also confirmed that no new funding has yet been allotted for recovery of giant kelp as part of the 'priority place' designation.[71]

2.69 In the following chapter of this report, the committee discusses the management of another invasive pest species, the crown-of-thorns starfish (COTS), which affects the Great Barrier Reef. Dr Fraser confirmed that programs to address COTS are funded by the Commonwealth, given the EPBC Act considers the Great Barrier Reef as a Commonwealth responsibility both as a 'matter of national environmental significance' and as a 'World Heritage property'.[72]

Biosecurity and key threatening processes

2.70 The Department of Agriculture, Fisheries and Forestry (DAFF) is responsible for 'managing border biosecurity arrangements for exotic marine pests and for coordinating national arrangements for managing introduced (non-native) marine pests'.[73]

2.71 However, Centro cannot be managed under this framework as the *Marine Pest Plan 2018-23* specifically excludes 'the undesirable economic, environmental and social effects' caused by 'species native to Australia, including those undergoing range expansions'.[74]

2.72 Other than being noted as a secondary threat under Conservation Advice for the listed giant kelp ecological community, there is no requirement for Centro to be specifically managed under Commonwealth environmental protection laws, as it is not listed as one of the twenty-one key threatening processes under the EPBC Act.[75]

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70 Dr Fiona Fraser, Threatened Species Commissioner, DCCEEW, *Committee Hansard*, 7 June 2023, pp. 54–55.

71 Dr Fiona Fraser, DCCEEW, *Committee Hansard*, 7 June 2023, p. 54.

72 Dr Fiona Fraser, DCCEEW, *Committee Hansard*, 7 June 2023, p. 53. See also: Department of the Environment, *Matters of National Environmental Significance Guidelines* (2013) (accessed 2 November 2023).

73 DAFF, *Submission 12*, p. 3.

74 Marine Pest Sectoral Committee, *Marine Pest Plan 2018-2023* (2018), p. 7. Similarly, the National Marine Pest Surveillance Strategy also excludes native range-expanding species, as its definition of marine pests only include non-native species. Marine Pest Sectoral Committee, *National Marine Pest Surveillance Strategy* (2019), p. 20 (both accessed 2 November 2023).

75 Rowan Trebilco, Mibu Fischer, Cass Hunter, Alistair Hobday, Linda Thomas, and Karen Evans, *Australia State of the Environment 2021: Overview* (2021), p. 115 (accessed 2 November 2023). Again,

Research

2.73 The Commonwealth agencies—the Australian Institute of Marine Science (AIMS) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO)—undertake research relating to the marine environment, including the impact on ecosystems occurring due to climate change. The role of these agencies includes 'contribut[ing] to policy development and deliver[ing] critical monitoring and research on the marine environment, and potential applications of new technology'.[76] CSIRO's Oceans and Atmosphere Business Unit also partners with DCCEEW's Australian Antarctic Division to assist the work of the University of Tasmania's IMAS.[77]

2.74 The Fisheries Research and Development Corporation (FRDC) also undertakes various research work, with the statutory authority being jointly funded by the Australian Government and the fishing industry.[78] The FRDC has funded a number of projects on invasive sea urchins.[79] The FRDC recently committed to the project 'Analysis of historical sea urchin research for improved management of nearshore fisheries in NSW', which seeks to 'analyse historical unpublished data on the ecology of Centro and its interactions with nearshore biota and augment the findings with oral histories of fishers to inform desirable outcomes for nearshore reef management'.[80]

2.75 The Commonwealth also funds research into certain environmental matters through the National Environmental Science Program (NESP) and the Cooperative Research Centre Program (CRC Program), which attract co-funding from other sources including industry.[81]

2.76 The department outlined a number of NESP-funded research projects relevant to this inquiry, including into the Great Southern Reef, restoration of giant kelp, and monitoring biodiversity in Marine Parks.[82]

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see the following chapter for a discussion of the Commonwealth's approach to managing crown-of-thorns starfish on the Great Barrier Reef, including an 'integrated pest management' program developed by the CSIRO.

76 DCCEEW, *Submission 32*, p. 1.

77 IMAS, *Submission 38*, pp. 3–4, 7 and 30–31.

78 See Fisheries Research and Development Corporation (FRDC), *About FRDC* (accessed 2 November 2023).

79 See also FRDC, *Submission 36*, p. 10.

80 FRDC, *Analysis of historical sea urchin research for improved management of nearshore fisheries in NSW* (accessed 2 November 2023).

81 DCCEEW, *Submission 32*, pp. 3–4.

82 DCCEEW, *Submission 32*, pp. 3–4.

2.77 Similarly, the IMAS-led Blue Economy CRC was established to undertake research focussed on industry and training, including developing aquaculture. It is currently considering Giant Kelp farming technologies, including the 'use of farm modules to inoculate natural reefs to be trialled at scale'.[83]

2.78 The following chapters of this report discuss: the opportunities offered by Centro, particularly as a premium foodstuff (chapter 3); before setting out calls for a national approach, the Task Force's Five Year Business Plan, and the committee's views and recommendations (chapter 4).

[83] IMAS, *Submission 38*, p. 13.

Chapter 3
Opportunities for industry

3.1 The environmental and economic challenges of managing *Centrostephanus rodgersii* (Centro) are substantial, as outlined in the previous chapters of this report. This chapter turns to the potential economic and commercial opportunities Centro offers, including as a premium commercial food product.

3.2 This potential market opportunity of Centro harvesting would offer a rare win-win benefit for both industry and the environment simultaneously, as strategic commercial harvest practices will reduce Centro numbers and the spread of urchin barrens. This could allow for marine habitat and species recovery supported by regeneration programs and, in turn, support rebuilding populations for existing abalone and lobster fisheries.

3.3 This chapter considers what is needed to build a viable industry around urchin harvesting, from skills and capacity building of a workforce, through to market research and development both in Australia and overseas. It sets out evidence on:

- opportunities offered by Centro harvesting as a premium food product, and other uses;
- potential reforms to fishery licenses and quotas; and
- support for industry, in processing and skills capacity, as well as market research and development.

3.4 This chapter concludes with a case study of the management of crown-of-thorns starfish (COTS) on the Great Barrier Reef (GBR), as this is illustrative of:

- successful Commonwealth co-management of environmental challenges associated with marine pest species;
- the use of Commonwealth funding for management programs, which sustain heathy environments, and thereby the businesses and communities that depend on them; and
- the substantial opportunities that Centro offers for a viable and sustainable industry, which other species—including COTS—do not.

Market for Centro as a premium foodstuff and other uses

3.5 A number of stakeholders provided evidence on Centro as a premium food product (see Figure 3.1), highlighting the significant growth opportunity for the seafood industry, not only in cultivating export activities, but potentially driving local demand. It was noted that more research is needed in several areas.

3.6 Urchinomics provided an overview of the global sea urchin market, estimated to be around $495 million per annum (based on 2018 global production and Japanese import data), with Japanese imports accounting for approximately 70 per cent of this

total. Further to this, Urchinomics provided projections of a global market that could rise to $4.93 billion per annum, from a production volume of 680 000 tonnes from both wild stock and farmed urchins.[1]

3.7 Mr John Minehan, the Treasurer of the Victorian Sea Urchin Divers Association Inc., summed up the value and employment opportunities offered by urchin harvest:

> Sea urchins are a valuable resource. Domestically, the roe sells for between $200 and $400 per kilo. The harvesting and processing of urchins is very labour intensive, creating lots of employment opportunities in regional communities. Commercial harvesting is likely to be the most cost-effective method for the long-term management of centro in the near-shore areas, helping to prevent the further expansion of urchin barrens. The harvest from Victoria complements that from New South Wales, supporting mainland processes targeting the domestic and export markets.[2]

3.8 The Australian Marine Conservation Society (AMCS) outlined the opportunities for domestic markets:

> Sea urchins are a delicacy in many cultures and potentially lucrative seafood markets, and Australian seafood tastes are beginning to diversify again after a generation of narrowing towards once-ubiquitous but increasingly unaffordable seafood options.
>
> Sea urchins are not currently a well-recognised seafood option in many Australian communities, so there is very high potential to develop a domestic market ...[3]

3.9 Stakeholders have suggested that further research is necessary into increasing Australia's access to international markets and the potential difficulties of transporting Centro roe. For example, the Centro Workshop in February 2023 suggested that there was a need to better understand the economic and industry opportunities to develop export markets further:

> There is also a real opportunity to create local, national and international markets for Centro products and build its brand as a luxury seafood. Industry should be exploring the use of middle/lower quality urchin roe in food avenues such as dumplings, or the use of by-product in fertilisers and in Chinese medicine. A piece of work is needed to map the economic opportunities (employment, industry) and inter-industry collaboration space, with industry working to achieve 'triple-bottom line' benefits (economic + social + environmental).[4]

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1 Urchinomics, *Submission 20*, pp. 8 and 10.

2 Mr John Minehan, Treasurer, Victorian Sea Urchin Divers Association Inc, *Committee Hansard*, 6 June 2023, p. 2.

3 Australian Marine Conservation Society (AMCS), *Submission 37*, pp. 2–3.

4 National Centrostephanus Workshop, 1 & 2 February 2023, *Final Report*, p. 14.

Figure 3.1 Centro as a premium food product

Source: Sea Urchin Harvest

3.10 The Institute of Marine and Antarctic Studies (IMAS) noted that ensuring the quality of urchin roe was a challenge that could be addressed through research and product development (R&D):

> Urchin roe quality is variable in space and time, and varies from near worthless to $100's/kg for A-Grade. R&D to enhance roe quality across all stages of production, including in water biomass enhancement, handling, transport and processing, could lead to significant gains in industry revenue meaning higher price to the diver from the processor and less government expenditure for a subsidy.[5]

3.11 Mr Mark Allsop, the Managing Director of True South Seafood, and Mr Alvaro Maz, a Special Advisor to Urchinomics, both spoke of the need for investment and development to improve post-harvest processing and transport of urchin products, to be able to service global markets.[6]

Non-food product uses

3.12 In addition to the urchin's potential value as a premium food product, a number of other potential uses were canvassed. Most significantly, the committee received

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5 The Institute of Marine and Antarctic Studies (IMAS), *Submission 38* (Appendix 2, 'Challenges and opportunities for diver-based Longspined Sea Urchin control (Dr John Keane and Associate Professor Scott Ling)'), p. 1.

6 Mr Mark Allsop, Managing Director, True South Seafood and Mr Alvaro Maz, Special Advisor, Urchinomics, *Committee Hansard*, 3 February 2023, p. 24.

evidence that urchin waste products showed promise as an agricultural fertiliser and soil conditioner. IMAS summed up the outlook:

> Commercially harvesting sea urchins for their roe has helped to control urchin populations in Tasmania. Yet, the roe only accounts for ~10% of the urchin biomass, and in small production areas like Tasmania, this waste is destined for landfill.
>
> Providing a commercial market for this nutrient-rich waste stream through processing it into an organic soil amendment promotes a circular economy through repurposing, recycling and value-adding, whilst tackling broader issues such as environmental and economic sustainability.[7]

3.13 Regarding the use of waste in fertiliser, it was suggested this could not only be a way of utilising unused material from food-grade urchin processing, but also for the harvesting of urchins of lesser quality that are unsuitable for food consumption.[8]

3.14 Other innovative possibilities have been canvassed, including value-added urchin products for use in the cosmetics, pharmaceutical and aquaculture feed sectors.[9]

Support for industry

3.15 The committee considered evidence on what targeted industry support was needed. It was noted that modest near-term support for the developing a Centro industry could pay strong dividends in the future, as it could help create a self-sustaining and self-funding industry, that at the same time would mitigate damage to existing fisheries and play a key ecological role in managing urchin populations.[10]

Support for industry

3.16 The Abalone Association NSW (AANSW) outlined the challenges that divers and processors have faced in trying to develop harvesting and fishing techniques, along with the labour-intensive processing operations for good quality commercial roe:

> The challenge for the diver has been gaining the experience necessary to harvest urchins that are suitable for processing, as many urchins in low feed areas (barren habitats) contain poor quality roe and as such the divers have to quickly learn how to recognise the urchin "grazing lines" as well as targeting the right size and in a sustainable manner.

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7 IMAS, *Submission 38*, p. 22.

8 For example, see: Professor Adriana Vergés, Dr Ezequiel Marzinelli and Professor Peter Steinberg, University of New South Wales, *Submission 21*, p. 4; Tasmanian Government, *Submission 30*, p. 4; Fisheries Research and Development Corporation, *Submission 36*, p. 14; IMAS, *Submission 38*, p. 8; Tasmanian Seafood Industry Council (TSIC) et al, *Submission 39*, p. 5.

9 Centro Task Force, *Centro Business Plan*, September 2023, p. 17.

10 See, for example, the findings of the National Centrostephanus Workshop, 1 & 2 February 2023, *Final Report*, p. 15.

> The challenge for the processor on any given day is engaging and keeping staff with the skills appropriate to producing a high quality seafood product for both domestic and export markets.[11]

3.17 The Task Force summed up its rationale for targeted industry support for processing:

> During consultation with stakeholders, many provided strong feedback that support for processing facilities to be commercially competitive and more innovative is essential. Feedback suggested that support is needed to adhere to eco-friendly principles, minimize waste, adopt innovative processing techniques, staff recruitment, training and retention, establish value-added products, value-added food products, use of waste (the potential of synthetic biology etc), and encourage/enable more innovative use of all of the components of the urchin.[12]

3.18 Mr Travis Dowling, Chief Executive Officer of the Victorian Fisheries Authority, suggested that there is an opportunity for an industry to be built around urchins, but it is currently limited by the number of processing facilities, logistics challenges and the need to develop a skilled workforce:

> We estimate we've got a 45,000-tonne biomass that we're harvesting less than 100 tonne a year on … With those processors there are challenges such as what happens to the urchin waste, the logistics of moving urchins from the east coast of Victoria to Melbourne where some of the processors might operate, or establishing local processors. There are opportunities in terms of a skilled workforce or labour force to be able to assist in processing. It really is a great opportunity.[13]

3.19 AANSW suggested that it was 'essential' to fund the processing sector, to prepare for the future growth of the urchin industry.[14]

3.20 A number of stakeholders highlighted that improving skills in the processing and diving industry was another important development area. For example, Mr Chris Theodore, the Chief Executive Officer and Director of Sea Urchin Harvest told the committee:

> You really need highly skilled divers to select the right urchins, especially in New South Wales. Ninety per cent of them have poor roe quality. It's just a skill. Most of the divers have been born into the game, in abalone, and done it all their lives.

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11 Abalone Association of NSW (AANSW), *Submission 1*, p. 1.

12 Centro Task Force, *Centro Business Plan*, September 2023, p. 16.

13 Dr Kate Watermeyer, Project Officer, Marine Knowledge Team, Department of Energy, Environment and Climate Action (DEECA), Victoria; and Mr Travis Dowling, Chief Executive Officer, Victorian Fisheries Authority, both at *Committee Hansard*, 6 June 2023, p. 33.

14 AANSW, *Submission 1*, p. 3.

> If you get unskilled divers, they select the wrong ones. And then there is the processing. You've got to be really good with people. You need a lot of staff …[15]

Figure 3.3 Senators Bilyk and Whish-Wilson visiting True South Seafoods

Source: Senator Peter Whish-Wilson

3.21 Mr Julian Harrington, Chief Executive of the Tasmanian Seafood Industry Council, also noted there was an urgent need for support to develop a skilled workforce in processing:

> Processors talk about this a fair bit. It's quite a specific bit of training and it takes time to be able to clean the roe and get all the membrane off the roe to a standard that's acceptable in the market. It's quite a tedious job, from what I understand, and it takes time to train individuals up. We need to work on strategies to attract and retain people in that space—the processors say it's not an area where you can just keep turning over staff because it takes too long to retrain them.[16]

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[15] Mr Chris Theodore, Chief Executive Officer and Director of Sea Urchin Harvest, *Committee Hansard*, 7 June 2023, p. 10.

[16] Mr Julian Harrington, Chief Executive, Tasmanian Seafood Industry Council, *Committee Hansard*, 3 February 2023, p. 17.

Figure 3.4 Packaged sea urchin roe

Source: Institute of Marine and Antarctic Studies

Coordination of fisheries

3.22 Responsibility for the management of Australian fisheries is shared across Commonwealth and state jurisdictions.[17] Similarly, harvest strategies are developed by the relevant jurisdictions to ensure that fisheries are ecologically sustainable, productive economically, and achieve positive social outcomes for communities such as workers in fisheries, their families, and consumers.[18]

3.23 As discussed in this report, the management of Centro is subject to differing management arrangements across jurisdictions, given its native status in NSW, and range expansion into Victoria and Tasmania.[19] Some evidence suggested that there is an opportunity, in all three states with growing populations of Centro, to reform fishery licenses and/or harvest strategies, in collaboration with the Commonwealth.

3.24 For example, Dr Thor Saunders, the Director of Fisheries Research, NSW Department of Primary Industries (Fisheries) (NSWDPI), told the committee that as different states will take different approaches, the Commonwealth could assist with overseeing co-regulation:

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17 Department of Agriculture, Fisheries and Forestry (DAFF), *Managing Australian Fisheries*; and Fisheries Research and Development Corporation (FRDC), *Jurisdiction* (both accessed 2 November 2023).

18 DAFF, *Commonwealth Fisheries Harves Strategy Policy and Guidelines*; and FRDC, *Applying social objectives to fisheries management* (both accessed 2 November 2023).

19 See the FRDC's report on the *Longspined Sea Urchin (2020)* for the coverage of Centro across jurisdictions (accessed 2 November 2023).

> Most jurisdictions are going to the best fisheries management practice of having a harvest strategy, which really stipulates a set of decision rules about what happens with resources when they're either going up or down, based on scientific evidence. It would just be acknowledgement of that [by the Commonwealth] … to enable it to be jointly administered across those jurisdictions.[20]

3.25 Similarly, Victorian Government representatives support the Commonwealth playing an increased coordination role, including for research, monitoring and setting standards. This could feed into the development of harvest strategies across jurisdictions:

> Dr Watermayer: … I think it's really difficult to make decisions or understand what's going on when everything's managed separately. Having a cohesive understanding of what's going on, where the priorities are, defining what our aims are and things like that I think is really important …
>
> Mr Dowling: We're looking at a tristate harvest strategy working across Victoria, Tasmania and New South Wales to really set some of those triggers, gather the data, make sure that we're all complementing each other with the measures we're undertaking. It's one ocean. They just move between us.[21]

3.26 Commonwealth agencies also supported a coordinated strategy. Dr Patrick Hone, the Managing Director of the Fisheries Research and Development Corporation (FRDC), told the committee that there is a positive move towards jurisdictions working together for a 'win-win' in fishery management, which will have positive flow-on results for the environment and business:

> The pleasing thing with New South Wales, Victoria and Tasmania agreeing to work collegiately on this is that for the first time we might manage this as one problem, not three problems … we often talk about harvest strategies, but what would one harvest strategy for urchin look like that gets delivered at a regional level? So, actually managing this as one connected problem across the states, but delivering the regional solution. Under climate change species are going to move across borders. So, actually having science to help those fisheries agencies manage this as one problem is really important. How the Commonwealth then just overlays other management requirements, whether it's their interest in kelp restoration or their interest in blue carbon or other environmental values, I think that will come. At the moment I'm very focused on getting those fisheries agencies to see there's an opportunity here to do this as one. As you said, we often try to get win-wins out of these things.[22]

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[20] Dr Thor Saunders, Director Fisheries Research, NSW Department of Primary Industries (Fisheries), *Committee Hansard*, 7 June 2023, p. 39.

[21] Dr Kate Watermayer, Project Officer, Marine Knowledge Team, Department of Energy, Environment and Climate Action, Victoria and Mr Travis Dowling, Chief Executive Officer, Victorian Fisheries Authority, *Committee Hansard*, 6 June 2023, p. 37.

[22] Dr Patrick Hone, Managing Director, FRDC, *Committee Hansard*, 6 June 2023, p. 47.

3.27 The willingness of states to work together on fishery policy was supported by non-government stakeholders. For example, a submission made by a group of Tasmanian stakeholders from marine industry (TSIC et al), commented that:

> A coordinated harvest strategy for Centro urchins, with an appropriate level of subsidy and scientific monitoring funding, represents a cost-effective tactic of maintaining our East Coast environment, and create improved economic return for fisheries, tourism, and related coastal industries and their dependent communities. The positive outcomes of this solution will build long-term resilience of marine habitats in the face of climate change and other negative inputs.[23]

3.28 The Centro Task Force's Business Plan noted that:

> The development of cross jurisdictional policies will be essential to the success of national management and coordination. The Centro Task Force proposes that a key role will be to examine current policies to consider conservation vs preservation approaches, and to generate a more cohesive habitat policy which is embedded into national Fisheries Policy. Such a policy must balance the prescriptiveness needed to ensure consistency among some methods with the flexibility needed to allow each jurisdiction to meet its discrete management and legislative requirements.[24]

3.29 The Business Plan noted several Commonwealth-related matters that require consideration, including:

- reviews of the Fisheries Management Acts of the Commonwealth (along with those of the three Centro-affected states);
- review of harvest strategies considering 'reform of habitat performance indicators';
- review of the Sustainable Ocean Plan;
- review of the National Fisheries Plan; and
- consideration of the development of a new Marine Habitat Management plan.[25]

Targeted subsidies for processing and harvest

3.30 Some submitters suggested that careful consideration needs to be given to targeted and time limited subsidies and concessions for new fishery licensees to encourage work in hard-to-reach areas that need ecological clearing of Centro.[26] Witnesses observed that a 'national approach' should be taken to strategically targeted and

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[23] Tasmanian Seafood Industry Council, Tasmanian Commercial Divers Association, Tasmanian Abalone Council and Tasmanian Rock Lobster Fishermen's Association, *Submission 39*, p. 15.

[24] Centro Task Force, *Centro Business Plan*, September 2023, p. 23.

[25] Centro Task Force, *Centro Business Plan*, September 2023, p. 23. Note that the Sustainable Ocean Plan is still in development at the time of writing. DCCEEW, *Sustainable Ocean Plan* (accessed 2 November 2023).

[26] For example, see: EZAAI and VSUDA, *Submission 4*, p. 5; Tasmanian Government, *Submission 30*, p. 7.

time-limited subsidies, which takes account of the status of the urchin and fishery health in each state.[27]

3.31 While many submitters supported the limited use of subsidies, the committee heard that to avoid unintended consequences they need to be carefully crafted, properly researched, consulted on, and effectively targeted. For example, Dr Hone of the FRDC told the committee:

> It is becoming a more competitive market out there. Yes, the economics of it are going to be complex and we'll probably only get to a certain point in solving this problem and then the government's going to have to ask: what is the economic science around subsidies? Clearly that's what Tasmania is doing at the moment. I think all of our science to date is that subsidies have unintended consequences. They're not necessarily a good management tool in fisheries. With subsidies, I think there's lots of evidence in fisheries that having subsidies is not a good thing. At the moment it is a good outcome for Tasmania, what they're doing. The question is: is that the long term? I think we probably need to do more research on that. Not a lot has been done on the economics of this fishery.[28]

3.32 Tasmanian subsidies and other economic incentives to manage Centro have been described as an 'essential management tool' in that state.[29] Submitters suggested that other states could also adopt a similar approach to incentivise harvests that take all qualities of Centro, not only those suitable for the foodmarket. Mr Tom Chadwick, President of the Tasmanian Commercial Divers Association, described how this worked in Tasmania, with targeted subsidies from the Abalone Council, to support divers in areas that were difficult to reach or not lucrative:

> Through industry consultation we were able to make an assessment of what extra cost it was to work in an area and what the densities were in the area … [T]he goal was to make it viable to work in all areas and achieve the same take-home after all your costs. There actually hasn't been direction yet that we would benefit from working in an area; it's just flattened out the line … so you can work most areas of the east coast ... for the same return on a day.[30]

3.33 Mr John Smythe, Secretary of the Abalone Association NSW, commented that the NSW industry found these subsidies made it difficult to compete:

> But we face a lot of competition from Tasmania. I believe you've been to Tasmania, where it has been regarded as a pest. Both the divers and the processors are subsidised down there. What happened 10 or so years ago with this subsidy aimed at eradicating the pest in Tasmania—they've put their product onto the markets that these processors have developed in New South

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27 See, for example: Mr John Smythe, Secretary, Abalone Association NSW, *Committee Hansard*, 7 June 2023, p. 6.

28 Dr Patrick Hone, Managing Director, Fisheries Research and Development Corporation (FRDC), *Committee Hansard*, 6 June 2023, p. 49.

29 Centro Task Force, *Centro Business Plan*, p. 14.

30 Mr Tom Chadwick, President, Tasmanian Commercial Divers Association, *Committee Hansard*, 3 February 2023, p. 16.

> Wales. It's given them an unfair advantage. Even recently, the product may be not as good a quality but it's selling for cheaper prices and people are buying it, so it's affecting our processors here. They have that unfair competitive advantage.[31]

3.34 Mrs Rachael Theodore, the General Manager of Sea Urchin Harvest, suggested that support for processors to develop processing capacity and for divers to harvest unprofitable or hard-to-reach populations, would have to be reconsidered over time:

> We support funding, but we think it should be processor focused. Subsidies are great for the diver. We really need to encourage more people to make this their full-time job, and many are starting to do that now. As the volumes are increasing, they're seeing that it actually is a really worthwhile full-time job. The demand for export orders is way more than we could ever supply, so that will keep happening. With subsidies to divers, we do worry that, when the subsidy runs out, we won't be able to afford to pay what they're used to. So that's one problem we see with diver subsidy.[32]

Opportunities to engage First Nations businesses and communities

3.35 It was noted that Centro harvesting offered substantial opportunities to engage First Nations businesses and communities, in both commercial and environmental management.[33]

3.36 For example, the NSW Aboriginal Land Council (NSWALC) noted the need to engage First Nations communities and Local Aboriginal Land Councils, not only in the environmental and governance aspects of Centro management, but also in economic and employment opportunities.[34]

3.37 Mr Wally Stewart, a Traditional Owner on the NSW South Coast and an Advocate for the NSW Aboriginal Fishing Rights Group, highlighted the need for increased First Nations involvement:

> For over 50,000 years Aboriginal people in New South Wales have managed the marine resources in our country and noticed changes in our waters. The proper management of the marine resources in our country is an ongoing cultural obligation we have as traditional owners. We welcome and encourage the opportunity to increase Aboriginal participation in and management of sea country, and to maximise employment and enterprise opportunities for traditional owners in NSW.[35]

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31 Mr John Smythe, Secretary, Abalone Association NSW, *Committee Hansard*, 7 June 2023, p. 2.

32 Mrs Theodore, General Manager of Sea Urchin Harvest, *Committee Hansard*, 7 June 2023, p. 11.

33 Mr Wally Stewart, *Submission 19*, p. 1; Mr Jeremy Day, *Submission 22*, p. 7; Professor Maria Byrne, *Submission 23*, pp. 1–2; Dr Benjamin Mos, *Submission 24*, p. 1; Australian Academy of Science, *Submission 28*, p. 1; NSW Aboriginal Land Council, *Submission 33*, p. 1; Blue Carbon Services, *Submission 41*, p. 3.

34 NSW Aboriginal Land Council (NSWALC), *Submission 33*, p. 1.

35 Mr Wally Stewart, *Submission 19*, p. 1.

3.38 Blue Carbon Services also identified a broad range of opportunities for First Nations participation:

> Due to the development of these two almost entirely 'new' industries (i.e. urchin fishing and kelp restoration), there are significant opportunities for co-development and leadership by Indigenous and First Nations communities, in support of their self-determined economic impact and engagement, the protection and care for their Sea Country, and for their broader participation in developing sustainable futures and communities.[36]

3.39 Several submitters noted the opportunities and barriers faced by Traditional Owners and First Nations communities in managing marine resources. For example, the NSWALC emphasised that:

> Strategies to promote engagement of Aboriginal peoples in the management of Sea Country must recognise that there may be varying levels of capacity within communities. As such, training and other support mechanisms should be provided to assist Aboriginal peoples to properly engage.
>
> There are a number of established land and sea ranger programs across Australia aimed at sustainable management of natural resources. Many of these, such as the North Australian Indigenous Land and Sea Management Alliance Ltd (NAILSMA) have demonstrated considerable expertise in training and management, research, data collection, and water policy and planning, and have developed a number of successful partnerships with government and non-government organisations. Such initiatives are providing a range of socio-cultural and economic benefits to community while contributing to biodiversity conservation efforts—however, most are significantly under-resourced and often rely on short term funding.[37]

3.40 Dr Paulina Selvakumaraswamy, from the School of Life and Environmental Sciences at the University of Sydney, submitted that:

> First nations communities have always lived in equilibrium with, and respected, their environments and so should be consulted at every level of decision making with respect to their cultural knowledge of species in such habitats.[38]

3.41 Regarding opportunities in business and industry, Mr Jeremy Day, a PhD candidate who is studying the ecology of sea urchin predators at the University of Newcastle, noted the opportunities to involve First Nations groups in commercial Centro operations:

> To date, harvesting urchins commercially in NSW or culling them in Southern states has not stemmed the tide of [Centro] larval flow into TAS [Tasmania] nor has commercial harvest in TAS reduced urchin populations there. Notably however, it has resulted in the development of a novel fishery which is a net-positive for nearshore communities and offers great utility for involvement

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36 Blue Carbon Services, *Submission 41*, p. 3.

37 NSWALC, *Submission 33*, pp. 3–4.

38 Dr Paulina Selvakumaraswamy, University of Sydney, *Submission 29*, p. 2.

> of first-nations peoples in commercial fisheries, and this should be a priority for the government moving forward.[39]

3.42 Dr Hone of the FRDC told the committee of the emerging prospects for First Nations groups:

> Harvesting urchins is obviously a win. We can actually monetise that and we can also create community values out of that and it can create new opportunities because it's a new fishery. First Nations who are held out of original fisheries can now come into a new emerging fishery.[40]

3.43 Professor Maria Byrne, from University of Sydney's Marine Biology, Ecology & Evolution Lab, highlighted similar opportunities:

> In NSW there is also a considerable recreational harvest, mostly focussed around urban areas. This fishery provides a mechanism to reduce urchin populations and an important opportunity for industry to develop through sustainable harvest and management of sea urchin stocks co-led by First Nations communities.[41]

3.44 The Australian Academy of Science spoke of the potential productivity benefits of management programs, and First Nations opportunities:

> Improving the yield of product in barrens provides a mechanism to reduce urchin density through sustainable harvesting and may represent an opportunity to be led by First Nations communities.[42]

Opportunities to engage recreational fishers

3.45 Evidence also showed that there are also opportunities for recreational fishers to participate in research, monitoring, and regeneration and management programs.

3.46 For example, Mr Craig Starritt, a Member of VRFish's Dive Fishery Reference Group Subcommittee, outlined why these groups were interested in Centro:

> Recreational divers and fishers alike are seeing the impact of invasive species on our marine ecosystems. That includes going for a scallop dive in the bay and seeing lines of starfish eating scallops. Economic loss from climate-related marine invasive species will extend into the recreational fishing and diving industry.[43]

3.47 Ms Jane Gallichan, the Chief Executive Officer of the Tasmanian Association for Recreational Fishing Inc. (TARFish), outlined what these stakeholders could offer:

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39 Mr Jeremy Day, *Submission 22*, p. 7, referencing removed.

40 Dr Patrick Hone, FRDC, *Committee Hansard*, 6 June 2023, p. 47.

41 Professor Maria Byrne, Marine biology, Ecology & Evolution Lab, University of Sydney, *Submission 23*, p. 2.

42 Australian Academy of Science, *Submission 28*, p. 1.

43 Mr Craig Starritt, Member, Dive Fishery Reference Group Subcommittee, VRFish, *Committee Hansard*, 6 June 2023, p. 24.

> Our message is that recreational fishers want to be active participants in managing centro, and should be enabled to do that in a way that complements the commercial dive harvest, and believe it is possible. In addition, TARFish undertook a survey of Tasmania's recreational fishers in 2020. We found that 80 per cent of fishers actively support and are likely to participate in kelp reforestation.
>
> Engaging recreational fishers in both has the potential to employ fisher participation to address changes in the marine environment, with outcomes for biodiversity in high-value recreational areas in Tasmanian marine waters.[44]

3.48 Mr Ben Celeveland from OZfish Unlimited supported this:

> There are some great examples of positive, community-driven restoration and intervention occurring nationally, from seagrass to shellfish restoration, involving both rec fishers and divers together. The community efforts towards the issues that we speak to today are complementary to the proposed commercial efforts.
>
> Engaging the community, particularly rec fishers, divers and boaters in management actions directly supports the first principle of international standards of ecosystem restoration, which is to engage stakeholders, particularly local stakeholders, in restoration efforts. The community's involvement in management and restoration approaches will be a key part of the success of stemming the tide of habitat loss and invasive species impacts along our coastlines. Mobilising the community of rec fishers we have at hand, alongside research, industry and government sectors, will put us in good stead to achieve successful outcomes into the future.[45]

Partnership opportunities for kelp forest restoration

3.49 Some stakeholders identified partnerships with environmental and community groups as potential areas of opportunity for ecology restoration and species recovery.

3.50 Professor Scott Ling, an ARC Future Fellow for the Institute of Marine, noted that IMAS was working with the Nature Conservancy Australia (Nature Conservancy) on programs to restore giant kelp forests and reef ecologies. He suggested that this was 'about creating a restoration economy', in which a kelp restoration program could drive employment, as well as increase tourism.[46]

3.51 Dr Fiona Valesini, the Director of the Oceans Program (Australia) for the Nature Conservancy outlined the feasibility of a giant kelp restoration program:

> It's the Nature Conservancy's view that restoration of the giant kelp habitat … is entirely doable with concerted effort … We formed that view given our experience in trying to replace a similarly decimated habitat, lost shellfish reefs

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[44] Ms Jane Gallichan, Chief Executive Officer, Tasmanian Association for Recreational Fishing Inc., *Committee Hansard*, 6 June 2023, p. 23.

[45] Mr Ben Cleveland, Senior Program Manager, Victoria and Tasmania, OzFish Unlimited, *Committee Hansard*, 6 June 2023, pp. 24–25.

[46] Professor Scott Ling, ARC Future Fellow, IMAS, *Committee Hansard*, 3 February 2023, p. 7.

> around Australia. We currently have a national partnership with the Australian government which is focused on bringing back 30 per cent of those lost shellfish reef habitats. Like giant kelp, we've lost more than 90 per cent of our shellfish reefs, so we're currently unpacking a national initiative to bring that back. Our experience in that space leads us to believe that restoration of a similarly imperilled habitat in giant kelp is entirely possible with concerted effort.[47]

3.52 The Nature Conservancy noted the importance of drawing on community support, including from First Nations communities, emphasising that positive environmental outcomes could be achieved alongside economic and community benefits.[48] Its submission outlined its 'Reef Builder' work on restoring shellfish reefs, suggesting this could be a model for kelp ecology restoration:

> In just over seven years, [the Nature Conservancy] has catalysed over $40 million in public and private investment and built close to 20 large-scale reef restoration projects across southern Australia from Perth to Noosa (with some up to 20 ha in size) harnessing public support and galvanising research-industry-government-community collaborations. Our work is science-led, draws on our expertise in managing large-scale marine construction projects, and centres on the dual benefits for people (jobs, improved lifestyles, connection to country) and nature (more resilient ecosystems). This model has evolved over 20 years of experience in recovering seagrass, mangroves, shellfish and coral reefs in 200+ projects globally.[49]

3.53 In a hearing, Dr Valesini outlined more details about the Nature Conservancy's kelp regeneration pilot trial in Tasmania, which had only just received funding from government since making its submission to the inquiry:

> Pairing closely alongside actually doing the active kelp restoration on ground will be taking or harvesting of urchins out of those areas, so remove that predation pressure first, maintain it over time and, in conjunction, pairing that with the kelp restoration … [This will be done by leveraging volunteers for which] we intend to engage the commercial dive industry. Really that's the jobs piece … to be taking or harvesting the urchins alongside that. We've been so pleased with the job generation from Reef Builder. I think over the whole program we had a target of 170 jobs. We're two years into it and we're already 250 per cent above that. We've already generated 420 direct jobs just out of the reef building alone.[50]

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47 Dr Fiona Valesini, Director, Oceans Program (Australia), Nature Conservancy (Australia), *Committee Hansard*, 3 February 2023, p. 49.

48 The Nature Conservancy, *Submission 34*, p. 1; and Dr Fiona Valesini, Director, Oceans Program (Australia), Nature Conservancy (Australia), *Committee Hansard*, 3 February 2023, p. 50.

49 Nature Conservancy, *Submission 34*, p. 1.

50 Dr Fiona Valesini, Director, Oceans Program (Australia), Nature Conservancy (Australia), *Committee Hansard*, 3 February 2023, pp. 53–54. More information on this program and the partnerships that support it can be found on the website of the Nature Conservancy, 'The Nature Conservancy announces unique Giant Kelp forest restoration partnership', *Media release,* 10 July 2023.

3.54 In providing evidence about the pilot kelp restoration trial, Dr Valensini emphasised that partnerships should be 'multi-sectoral', drawing on science, industry, community, government and management, including First Nations communities. Moreover, it was suggested that the program would build in an innovative approach—for instance, leveraging citizen scientists for monitoring the health of kelp through a 'kelp tracker' app.[51]

Figure 3.5 Sea Urchin with Osetra Caviar, Coconut Cream, Coriander Oil, Radish and Cashew

Source: Sea Urchin Harvest

Marketing

3.55 The Final Report of the Centro Workshop in early 2023 noted that there is a need for better 'brand development' for Centro roe as a product. It was suggested that there needed to be careful delineation between the view that it was a pest species in some regions, whereas it was endemic to others, 'so as to not damage Centro roe as a luxury food item'.[52]

3.56 This was also drawn out in several submissions, as well as evidence at hearings.[53] For example, the Tasmanian Government submitted that:

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51 Dr Fiona Valesini, Director, Oceans Program (Australia), Nature Conservancy (Australia), *Committee Hansard*, 3 February 2023, p. 50.

52 National Centrostephanus Workshop, 1 & 2 February 2023, *Final Report*, p. 10.

53 For example, see: AANSW, *Submission 1*, p. 2; Eastern (Victorian) Zone Abalone Industry Association (EZAIA) and (Eastern) Victorian Sea Urchin Divers Association (VSUDA), *Submission 4*, p. 5; Tasmanian Government, *Submission 30*, p. 7; Tasmanian Seafood Industry Council (TSIC), Tasmanian Commercial

> Education, media, and outreach organisations to help Australians understand the threats posed by urchins and promote understanding of the benefits of control and responsible harvesting of urchins (e.g., a seafood marketing campaign to target the environmental benefits of urchin consumption).[54]

Case study: crown-of-thorns starfish on the Great Barrier Reef

3.57 COTS is a species of marine invertebrate that is one of the most significant threats to the long-term health of the GBR. This section outlines strategies that have been used to manage COTS, as well as the funding allotted to monitoring and reduction activities by the Commonwealth.

3.58 Although key differences between the species were noted in evidence, some stakeholders suggested the COTS example could potentially inform the effective management of Centro. Additionally, it was widely acknowledged that effective Centro management also offers a substantial economic opportunity, due to its value as a premium foodstuff—whereas COTS does not.

3.59 For example, when questioned on the suitability of the COTS federal-state joint model for management of invasive species, Dr Hone of the FRDC, acknowledged that there are aspects of the management plan that can be used to combat Centro:

> The lessons that they've learned from the crown-of-thorns are important because it does very similar things. It changes the ecosystem, and therefore understanding the economics, particularly about how they've done it and clearly also understanding how they've engendered community based buy-in … So yes, I think the crown of thorns is a good example.[55]

3.60 The Centro Workshop Final Report also made it clear that there was broad agreement that:

> We need to learn from other control programs: The Crown of Thorns Starfish … management response strategy on the Great Barrier Reef received significant funding and included an effective and proven Integrated Pest Management Approach (IPM) that could be applied to the Tasmanian Centro issue. The Lion Fish project also provides valuable learnings with regards to community engagement in culls, cooking options and ongoing management to restore reef ecosystems.[56]

3.61 In this, some noted the potential model for Centro management provided in work on COTS undertaken by the CSIRO's integrated pest management program, which is funded through the Commonwealth's National Environmental Science

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Divers Association (TCDA), Tasmanian Abalone Council (TAC) and Tasmanian Rock Lobster Fishermen's Association (TRLFA), *Submission 39*, p. 5.

54 Tasmanian Government, *Submission 30*, p. 7.

55 Dr Patrick Hone, FRDC, *Committee Hansard*, 6 June 2023, p. 49.

56 National Centrostephanus Workshop, 1 & 2 February 2023, *Final Report*, p. 10, capitalisation removed.

Programme (NESP).[57] Dr Ian Dutton, the General Manager of Marine Resources, Department of Natural Resources and Environment Tasmania, told the committee:

> That [CSIRO] report was a seminal piece of work from our point of view. This was an integrated pest management program within CSIRO, a unit that was focused early on dealing with the crown-of-thorns strategy … But the report itself is a really great roadmap. It doesn't actually propose … a single strategy. It's not about trying to eradicate. It actually has a mosaic of approaches depending on the situation, and that has underpinned [an] integrated program that would involve having teams of divers, potentially Aboriginal sea country rangers, potentially commercial divers, potentially even involving community divers in the water, supported to undertake those different control strategies. And in that report you'll see each of those approaches has different parameters around operating. But that's where we think that there's a real synergy in working in that way. And each state will work slightly differently, depending on the composition of the issues and goals, but there would be a sort of national backbone, if I can use that term, of support from groups like CSIRO, FRDC and other organisations helping us to coordinate and make sure that the data were being collected in a comparable way.[58]

Effects and management of COTS

3.62 The GBR is one of the world's best-known coral reef ecosystems, and is protected under Australia's environmental legislative framework. It has been World Heritage listed since 1981 for its unique natural attributes and significant scientific and environmental value.[59]

3.63 The GBR is managed jointly by the Commonwealth through the Great Barrier Reef Marine Park Authority (GBRMPA), in partnership with the Queensland Government, together with local governments, Traditional Owners, industry, research bodies and community organisations under the *Great Barrier Reef Marine Park Act 1975*.[60]

3.64 However, the GBR also faces significant threats to its health, including tropical storms, coral bleaching events, and outbreaks of COTS. Although COTS is species native to the GBR, several population outbreaks since 1962 have caused major coral loss on the reef. The starfish goes through 'boom and bust' cycles of population explosion and decline, with outbreaks lasting around 10–12 years.[61]

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57 See the summary of this work at CSIRO, *Managing Crown-of-thorns starfish on the Great Barrier Reef*, including a link to its report.

58 Dr Ian Dutton, General Manager—Marine Resources, Department of Natural Resources and Environment Tasmania, *Committee Hansard*, 3 February 2023, p. 57.

59 DCCEEW, *Great Barrier Reef World Heritage Area* (accessed 2 November 2023).

60 Great Barrier Reef Marine Park Authority, *Our Story* (accessed 2 November 20233).

61 Australian Institute of Marine Science, *Crown-of-thorns starfish* (accessed 2 November 2023).

3.65 This has impacted the health of some areas of the GBR significantly, and in turn, threatened not only the sustainability of the environment, but also local tourism-dependent businesses reliant on the Reef.

3.66 COTS is managed under GBRMPA's *Crown-of-thorns starfish Strategic Management Framework* (COTS Framework), which emerged from the development of the *Reef 2050 Long-Term Sustainability Plan*.[62]

3.67 The COTS Framework sets out a holistic management strategy addressing the entire cycle of outbreaks, combining 'long-term management actions aimed at preventing outbreaks, with tactical response actions aimed at minimising coral mortality and promoting recovery when outbreaks are underway'. This includes:

> Preventative actions, which are ongoing across the outbreak cycle, include improving water quality and the protection of COTS predators. Once an outbreak begins to develop, management then ramps up tactical response actions aimed at suppressing and containing the outbreak to the initiation region, or protecting coral at high value locations if the outbreak cannot be suppressed and contained. These tactical responses are currently delivered through the Marine Park Authority's COTS Control Program. This Control Program operates on modern principles of Integrated Pest Management (IPM) and will continue to evolve and apply new pest management tools and technologies as they become available.[63]

3.68 The COTS Control Program is supported by a monitoring program that underpins COTS management, including environmental factors that could provide early indicators of outbreaks, drawing on a wide range of inputs such as public sightings, marine park rangers, and surveys by scientists.[64]

3.69 Ms Katrina Maguire, Division Head of the International Environment, Reef and Oceans Division for the Department of Climate Change, Energy, the Environment and Water (DCCEEW) outlined the significant investment made by the Commonwealth in COTS management, as well as the economic and employment outcomes of COTS management programs:

> Since 2012-13, over the 10-year period, there's been an investment by the Australian government of about $120 million. Since that time, that has helped fund the surveillance and cull effort of 356 high-value reefs. It's involved 95,000 diver hours and has resulted in the detection and culling of more than 1.1 million crown-of-thorns and protected coral from starfish predation across more than 97,000 hectares of reef habitat. That's been the investment over the last 10 or so years …
>
> During 2022-23 so far there have been 29 full-time positions and 118 part-time positions. That includes seven full-time equivalent positions at the reef authority,

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62 GBRMPA, *Crown-of-thorns starfish Strategic Management Framework* (2020); and Australian Government, *Reef 2050 Long-Term Sustainability Plan* (2018)

63 *Crown-of-thorns starfish Strategic Management Framework*, p. 2.

64 *Crown-of-thorns starfish Strategic Management Framework*, p. 2.

> and the remainder are employed by vessel contractors. Eleven of those positions have been filled by First Nations people. Another 22 trainee and internship positions are via the Indigenous COTS Control and Leadership Program, coordinated by the Reef and Rainforest Research Centre and the INLOC group. That's been the investment.[65]

3.70 Ms Maguire confirmed that a further $149.4 million has been committed to COTS management by the Commonwealth to the end of this decade.[66]

3.71 A number of stakeholders noted the success of these efforts to manage COTS, and the tangible benefits to the GBR and dependent communities. In doing so, it was noted that the COTS management programs provided an example of effective marine pest management that could guide efforts to mitigate the effects of Centro.

3.72 For example, Professor Scott Ling, ARC Future Fellow at IMAS told the committee that:

> The only other analogous species here [to Centro] in the way they cull them is the crown-of-thorns starfish. They actually inject a chemical—basically an acid—into the starfish. We don't need to do that [with Centro]. We just need to compromise the test, or the shell, of the urchin and then it makes it very vulnerable to predators. They can be culled very effectively.[67]

3.73 Dr John Keane, an IMAS Research Fellow, noted that there were similarities in the way COTS and Centro had compromised not only environmental health, but also industry:

> … I think where the crown-of-thorns hits in the Great Barrier Reef is the impact on tourism. There are a lot of tourists diving under the water. We have less tourism in the Great Southern Reef, in south-eastern Australia, but we have higher-value fisheries. The economic impacts are probably of a similar magnitude, but instead of being tourism, it's fisheries and the ecosystem.[68]

3.74 Professor Ling of IMAS further noted that, whereas COTS was episodic and so allowed for environmental recovery, urchin barrens were a longer-term challenge once established:

> … the crown-of-thorns will go through these boom-and-bust outbreak cycles. With *Centrostephanus* … it'll boom, it'll collapse the reef, and then we're locked into that for the long term … So we're basically losing reef habitat. That's a real problem for fisheries management as well, because it means they're fishing harder and harder in a diminishing habitat. If they don't drop their total allowable catch, they're just concentrating their fishing and they're really fuelling

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65 Ms Katrina Maguire, Division Head, International Environment, Reef and Oceans Division, DCCEEW, *Committee Hansard*, 7 June 2023, p. 51. Note: INLOC group is a private consulting firm, specialising in 'delivering training, and operational support to Indigenous communities and groups, and their partner organisations, to achieve their own aspirations in caring for their own land and sea country'.

66 Ms Katrina Maguire, DCCEEW, *Committee Hansard*, 7 June 2023, p. 51.

67 Professor Scott Ling, ARC Future Fellow, IMAS, *Committee Hansard*, 3 February 2023, p. 12.

68 Dr John Keane, Research Fellow, IMAS, *Committee Hansard*, 3 February 2023, p. 12.

> this fire of the collapse of one stock after another. I would argue that the long-term ecological impacts of the long-spined sea urchin is a bigger impact on our southern reefs than the crown-of-thorns is on the Great Barrier Reef.[69]

3.75 A key difference between the management of Centro and other invasive species, such as COTS, is the opportunity build an industry around the harvesting of urchins. For instance, Professor Maria Byrne clearly differentiated between the nature, management and opportunities of COTS and Centro:

> I work on the crown-of-thorns starfish a lot, and it's not the same [as Centro], and I'd be very hesitant to put the two in the same boat. The big important thing with crown-of-thorns is that it comes and goes every 10 years—boom and bust, boom and bust, boom and bust. That is No. 1. Centrostephanus is … here all the time. No. 2, you can eat Centrostephanus; you can't eat the crown-of-thorns. So I think the approach to the two with respect to expenditure has to be totally different …
>
> With the Centrostephanus, we want to build up an industry.[70]

3.76 For example, Dr Keane pointed out that, unlike COTS management, Centro offered positive economic returns:

> … with crown-of-thorns, the only option is to cull them. For the long-spined sea urchin, we've got all these other options, including the commercial industry—the fishing—so there's an economic return … this is quite unique among a lot of pest-management scenarios in that there's an actual economic opportunity. I think that needs to be capitalised on.[71]

3.77 Dr Keane further observed that, where protection of the GBR would require continued investment in COTS management programs, Centro could be self-sustaining following an initial investment from government:

> Crown-of-thorns is going to need that continual funding because there is no economic return. With the sea urchins, hopefully, if we can set up an economic opportunity, it'll largely become self-funding … Crown-of-thorns is just going to be a continuing money sink—hopefully, with the sea urchin, we can set up industry to control at least large parts of the problem.

3.78 Ms Jane Gallichan, Chief Executive Officer of the Tasmanian Association for Recreational Fishing, noted that there had been no federal funding earmarked directly for the management of urchins and the restoration of kelp forests:

> To date, there has been no federal investment that I'm aware of in these two issues. When comparing this to the extensive and growing investment in crown-of-thorns that has delivered tangible environmental, social and economic

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69 Professor Scott Ling, IMAS, *Committee Hansard*, 3 February 2023, p. 12.

70 Professor Maria Byrne, Marine biology, Ecology & Evolution Lab, University of Sydney, *Committee Hansard*, 7 June 2023, p. 49.

71 Dr John Keane, IMAS, *Committee Hansard*, 3 February 2023, p. 12.

> benefits, it seems logical, indeed necessary, to meet that level of commitment for the management of centro and undertaking giant kelp reforestation.[72]

Committee view

3.79 The spread of Centro down the south-eastern coast of Australia clearly poses a substantial ecological and management challenge for affected states, as well the Commonwealth, as set out in the first two chapters of this report.

3.80 However, the committee received compelling evidence that this management challenge could be addressed in a way that also offers valuable new opportunities on several fronts. This evidence was remarkably consistent, with similar themes drawn out by government officials, representatives of professional fishing industry and recreational fishing groups, community and Traditional Owner groups, academic researchers, and environmental organisations.

3.81 There is clearly a potential win-win situation to establish a new fishery, support existing fisheries, and to better protect Australia's marine environment.

3.82 A new Centro fishery, supported by an effective processing and export sector, has significant potential to play a leading role in growing a new marine industry for urchin products, alongside targeting global and domestic markets, and reducing damaging urchin outbreaks in certain areas.

3.83 At the same time, a healthy urchin fishery could alleviate the pressures on established lobster and abalone fisheries, which are intensifying with Centro expansion and population growth. Effective management of urchin populations through strategic harvesting practices, would also prevent new barrens, and preserve and restore habitat supporting rock lobster and abalone recovery.

3.84 In turn, these benefits for marine industries could also contribute to the restoration of the broader sustainability and health of Australia's marine environment. Well-targeted and coordinated Centro removal and giant kelp reforestation programs would ensure healthy and sustainable habitat for fishery species, as well as protect the giant kelp marine ecologies that are threatened by Centro expansion.

3.85 Healthy fisheries would create new jobs for regional communities that depend upon the blue economy, in fishing, processing, environmental management, and tourism. Similarly, this would offer new opportunities for Traditional Owners, not only for employment, but also in the ongoing ecological management of the marine environment, and their ability to use sea resources for food and cultural purposes.

3.86 The substantial challenges of Centro expansion also offer considerable opportunities, both for the affected states and for the Commonwealth. The following chapter of the report looks at evidence calling for a coordinated approach to Centro management, and opportunities for the Commonwealth to play a leadership role in

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[72] Ms Jane Gallichan, Chief Executive Officer, Tasmanian Association for Recreational Fishing Inc., *Committee Hansard*, 6 June 2023, p. 23.

delivering this. It also discusses the Centro Task Force's Five Year Business Plan, and sets out the committee's views and recommendations.

3.87 In addition, the committee sees significant opportunities for the Commonwealth to proactively work with jurisdictions on maximising the win-win opportunities for industry and employment, as well as for local communities and the environment.

Recommendation 1

3.88 The committee recommends that the government consider working closely with relevant state governments to capture and harness the benefits offered by an emerging fishery for long-spined sea urchins, including:

- **developing a new fishery for Centro, while supporting existing fisheries for rock lobster and abalone;**
- **maximising employment opportunities in harvesting and processing for urchin products;**
- **coordinating research and policy across jurisdictions to encourage an economically and ecologically self-sustaining Centro fishery;**
- **fostering programs to protect and restore kelp and reef ecologies and the species that depend upon them, including innovative cross-sectoral work with industry, environmental organisations and communities;**
- **involving local, regional and First Nations communities in these opportunities; and**
- **assisting to grow overseas and domestic markets for urchin products.**

Chapter 4
A forward management plan

4.1 Earlier chapters have set out the challenges posed by the range expansion of the long-spined sea urchin *Centrostephanus rodgersii* (Centro) that are currently being faced by governments of all levels, industry and communities along the Great Southern Reef. Also set out are the concomitant opportunities accompanying the range expansion of Centro for industry to harvest urchins, and in doing so not only develop existing and build new businesses, but also to play a crucial part in environmental management.

4.2 In both cases, stakeholders strongly agree that the forward management of Centro requires a coordinated management plan, which balances the concerns of various stakeholders, while developing the necessary strategy, policy, and implementation to address challenges while maximising opportunities.

4.3 This chapter first sets out evidence supporting the adoption of a national leadership approach, to engage a diverse and complex group of stakeholders.

4.4 It then considers the work of the Centro Task Force set up in early 2023, which presented a forward-looking strategy for Centro management in September 2023, *Longspined Sea Urchin: Towards a national five year business plan* (Centro Business Plan or the Plan).

The need for a national approach to Centro management

4.5 A consistent theme of evidence to this inquiry advocated for a national management plan, to foster co-operation between stakeholders and to oversee the development and implementation of collaborative strategies. This position was shared by a broad range of stakeholders from government, research and policy development, and business.

4.6 Representatives of state governments spoke of the need to take a collaborative approach. For example, Dr Ian Dutton, the General Manager of Marine Resources, for the Department of Natural Resources and Environment Tasmania, stated:

> The Tasmanian government believes that it is timely and appropriate that this inquiry considers arrangements for a more integrated approach to management of the Great Southern Reef. There is an immediate need and opportunity to establish a comprehensive regional control program involving all key stakeholders to reduce the threats to the health of the Great Southern Reef, and to the livelihoods of those dependent on that reef, that are posed by the range-extended pest species of centro.[1]

[1] Dr Ian Dutton, General Manager, Marine Resources, Department of Natural Resources and Environment, Tasmania, *Committee Hansard*, 3 February 2023, p. 58.

4.7 Mr Travis Dowling, the Chief Executive Officer of the Victorian Fisheries Authority (VFA), spoke positively about cross-jurisdictional harvest strategies, as well as the opportunities for the Commonwealth to play a central role in Centro management:

> The key messages we want to give today are we see there is a role for the Commonwealth, whether it's business support or whether it's environmental support in terms of the culling...[2]

4.8 Noting that there is a different approach taken by New South Wales (NSW) to other states, as Centro is a local species, Dr Rachel Przeslawski, the Research Leader for Marine Ecosystems, NSW Department of Primary Industries (Fisheries) (NSWDPI), noted several areas that NSW is keen to progress collaboratively. These include contributing to 'jurisdiction-specific and cross jurisdictional regional management' and 'a national approach to supply chains and selling a product'.[3]

4.9 Dr Thor Saunders, Director Fisheries Research for the NSWDPI, outlined several areas where the Commonwealth could lead collaboration and reform—expressing a hope that:

> … the federal government could facilitate any cross-jurisdictional management frameworks that are being proposed ... it's primarily that ability to jointly do things [for example determine research priorities] where it's a bit problematic for jurisdictions individually to try to come up with some co-legislation to do that sort of stuff … It would … enable it [management frameworks] to be jointly administered across those jurisdictions.[4]

4.10 A number of stakeholders supported Commonwealth investment in a national approach and coordination. For example, Dr Fiona Valesini, the Director of the Oceans Program (Australia) for the Nature Conservancy Australia, spoke of the need for a common approach across levels of government:

> All levels of government … need to pull together in the same direction. Whoever is best placed to do that, I think the thing that is clear is that it needs a leader, a lead organisation that has a clear strategy, a coordination, a direction and a good business plan. Those are the key ingredients. That was one of the things that we learned from Reef Builder as well. It may not necessarily be federal government that is the leader; it may be federal government working in partnership with the lead agency to provide that oversight and coordination. It needs somebody that has the experience and the opportunity to bring those partnerships together. They will be complicated. A top-down approach here is

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2 Mr Travis Dowling, Chief Executive Officer, Victorian Fisheries Authority, *Committee Hansard*, 6 June 2023, p. 33.

3 Dr Rachel Przeslawski, Research Leader, Marine Ecosystems, NSW Department of Primary Industries (Fisheries), *Committee Hansard*, 7 June 2023, p. 37.

4 Dr Thor Saunders, Director Fisheries Research, NSW Department of Primary Industries (Fisheries), *Committee Hansard*, 7 June 2023, pp. 38–39.

> probably not the best one. It really does need to build from that groundswell of momentum that's coming up locally through the states, and have that opportunity for co-design. And it really needs a lead agency that can get across the complexity of that partnership.[5]

4.11 There was also support from industry. Ms Helen Burvill, the Executive Officer of the Eastern Zone Abalone Industry Association (EZAIA), stated that:

> If the urchin issue was above water, like feral pigs or feral deer, people could see it and then there would be lots of money thrown at it, and support. But we're effectively dealing with the crown of thorns starfish in the shape of the urchins. EZAIA supports the key actions identified in the [February 2023] national centro workshop in Launceston [including] an immediate need for a nationally coordinated and funded regional control program to reduce the threat to the Great Southern Reef and to protect the livelihoods of those dependent on the reef.[6]

4.12 Mr Dale Winward, a member of the Mallacoota Sea Urchin Divers Association, explained that it was 'imperative' for the future health of industry that the Commonwealth consider funding a national plan to coordinate Centro management:

> Basically, if it doesn't happen, the bottom [of the ocean floor] is going to get wiped out. There will still be a sea urchin industry, but the yields will be very low because they'll have nothing left to eat. There won't be an abalone industry and there won't be fish.[7]

4.13 Mr Tom Chadwick, President of the Tasmanian Commercial Divers Association, advocated for a national approach to also support industry:

> … we would definitely support lobbying for funding either way to nationalise a management plan for *Centrostephanus*. And with the action coming, we would obviously like to see it be heavily dependent on supporting fishing industries get underway, and processing and marketing and the like that have proven they can actually do the job. So, yes, we're definitely supportive of it. We will lobby for it and support it where we're needed.[8]

4.14 Professor Maria Byrne, a member of the Australian Marine Sciences Association, outlined the important role the Commonwealth could play in a forward management plan for Centro:

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5 Dr Fiona Valesini, Director, Oceans Program (Australia), The Nature Conservancy (TNC) Australia, *Committee Hansard*, 3 February 2023, p. 50. Reef Builder is a program of TNC Australia, which leverages public and private investment for large-scale reef restoration projects, as outlined in TNC, *Submission 34*, p. 1.

6 Ms Helen Burvill, Executive Officer, Eastern Zone Abalone Industry Association Inc., *Committee Hansard*, 6 June 2023, p. 2.

7 Mr Dale Winward, Mallacoota Sea Urchin Divers Association, *Committee Hansard*, 6 June 2023, p. 13.

8 Mr Tom Chadwick, President, Tasmanian Commercial Divers Association, *Committee Hansard*, 3 February 2023, p. 20.

> I think there's a huge role for the Commonwealth in this, with all the states that are involved that have the *Centrostephanus* challenge. *Centrostephanus* challenges are slightly different in the different states, but until the different states are talking together they can't actually explain their challenges to each other. For instance, if the Commonwealth was to provide funding to address the *Centrostephanus* challenge, how that funding would play out in a place like Tasmania might be quite different to how that funding plays out in New South Wales. As the fishers are saying, one of the biggest issues is that you've got the subsidy in Tasmania, and now Victoria and New South Wales can't talk to each other, because the processing plants are on either side of the border. So, there needs to be some leadership within the Commonwealth so that the states can all benefit from a sea urchin fishery.[9]

4.15 Mr Ben Cleveland, Senior Program Manager, Victoria and Tasmania, OzFish Unlimited, outlined the constraints posed by state frameworks to removal and restoration programs:

> Coordinating a national approach is critical to this. Whether you are talking about the removal of the urchins or the restoration we do post that, the challenges are around permitting and process and getting people in the water to undertake this kind of work; they are the key blockers for us of restoration around the country, a lot of the legislation and framework isn't built to make that happen.[10]

4.16 Professor Peter Steinberg, who appearred in a private capacity, suggested the Commonwealth was necessary for the success of Centro management, not only in a leadership role, but also as a source of funding:

> I think the Commonwealth has a very important role to play in bringing the states together so we can take a regional approach to this. And to be completely practical about it, I think the kinds of resources and support that are required to get the outcomes we want across south-east Australia probably come only from Commonwealth pockets. So, there's the coordinating bit and there's the resource bit.[11]

4.17 Mr Dowling of the VFA noted his organisation's partnership with the Task Force, and spoke positively on both its future work and the opportunities for the Commonwealth to assist:

> We're really optimistic about where the partnership is going to go. We do believe there is a role for the Commonwealth in terms of…the opportunities that urchins raise as well as the challenges… The key messages we want to give today are we see there is a role for the Commonwealth, whether it's business support or whether it's environmental support in terms of the culling, but getting industry on board with assisting them taking that next step now in terms

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9 Professor Maria Byrne, Australian Marine Sciences Association, *Committee Hansard*, 7 June 2023, p. 48.

10 Mr Ben Cleveland, Senior Program Manager, Victoria and Tasmania, OzFish Unlimited, *Committee Hansard*, 6 June 2023, p. 28.

11 Professor Peter Steinberg, Private Capacity, *Committee Hansard*, 7 June 2023, p. 48.

> of getting as many fish [Centro] out of the water and then having them processed and then having them sold.[12]

4.18 On the need for reform of existing frameworks, Dr John Keane, an Institute of Marine and Antarctic Studies (IMAS) Research Fellow, suggested that the Task Force would be a:

> … fantastic way to try to capitalise on all these opportunities. When you talk about fishing, predators and marine parks, there are many different rules and it's very complex. We need to work through these issues over time using marine spatial planning. Some of the barriers …are paper barriers. We know enough about the science and the biology [of Centro], what works and what doesn't work in terms of fishing, predation, culling and other options. It's a matter of speaking to the [fisheries] managers … about whether we use permits or exemptions or we change some of the legislation to implement the solutions because we know about the solutions.[13]

4.19 Dr Dutton, noted the general agreement in the Centro Workshop in February 2023, particularly:

> … the very strong desire of the 140 participants in that meeting for a more coordinated and integrated approach to management of the Great Southern Reef generally and to control the management of long spined sea urchins specifically.[14]

4.20 Dr Patrick Hone, Managing Director of the Fisheries Research and Development Corporation (FRDC), observed that stakeholders at these workshops overwhelmingly wanted an action plan that could start implementing practical approaches. Noting the FRDC's role in facilitating the workshop, he noted that participants:

> … clearly they want an action plan. They weren't just talking to us as the people who were doing the science and the managing agencies; they were also talking to this inquiry and saying that the time for talk, the time for conversations has gone. They really wanted more of an action orientated step so that when we come next to meet we're actually ticking off what we have done and achieved, whether that's restoration work, whether that's work to better understand how to mitigate urchins, whether that's work to build better community linkages or work to actually connect the three states better in terms of the policy setting. Clearly they were pushing for that. As a result, we did form a task force.[15]

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[12] Mr Travis Dowling, Chief Executive Officer, Victorian Fisheries Authority, *Committee Hansard*, 6 June 2023, p. 33.

[13] Dr John Keane, Research Fellow, Institute of Marine and Antarctic Studies (IMAS), *Committee Hansard*, 3 February 2023, p. 8.

[14] Dr Ian Dutton, General Manager, Marine Resources, Department of Natural Resources and Environment, Tasmania, *Committee Hansard*, 3 February 2023, p. 58.

[15] Dr Patrick Hone, Managing Director, Fisheries Research and Development Corporation, *Committee Hansard*, 6 June 2023, pp. 43–44.

Centro Task Force

4.21 This section first considers the initial impetus of the Task Force, which emerged from a national workshop in February 2023, convened to align with and inform this Senate inquiry.

4.22 It then considers the Task Force's Centro Business Plan as a potential way forward for the Commonwealth to work with a diverse range of stakeholders on the collaborative management of Centro.

National Centro Workshop, February 2023

4.23 On 1 and 2 February 2023, the National Centrostephanus Workshop (Centro Workshop) was held in Launceston, Tasmania. It was convened by the Department of Natural Resources and Environment Tasmania (NRE Tas), with co-sponsorship from the FRDC.[16] It brought together 140 representatives from industry, government, research, Aboriginal communities, and other community members. This Senate committee was invited to attend this workshop; its inquiry chair, Senator Peter Whish-Wilson, attended and participated in a discussion on the future management of Centro.[17]

4.24 The workshop followed and built on similar state-based workshops held in Victoria and New South Wales in 2022.[18]

4.25 According to the Final Workshop Report, it was convened as a response to this Senate inquiry, and to inform its work. Many of the participants at the workshop also participated in the inquiry, either by making written submissions or appearing at the hearings in Hobart on 3 February 2023, or in Melbourne or Sydney on 6 and 7 June 2023 respectively.[19]

4.26 The Workshop focussed on the key challenges posed by Centro, as well as the opportunity to discuss concerns that the range extensions of other native marine species could create environmental and economic challenges in the future. There was general support for more research, forecasting and modelling to understand the nature and extent of Centro, to develop a strategic approach to management, which could also provide models for future challenges.[20]

4.27 A significant area of agreement was that:

> … the lack of national funding was a major factor limiting more effective control. [Participants] also declared a need for … investment in ecosystem

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16 National Centrostephanus Workshop, *Final Workshop Report*, May 2023 (Final Centro Workshop Report), p. 4.

17 Final Centro Workshop Report, p. 28.

18 Final Centro Workshop Report, p. 4.

19 Final Centro Workshop Report, p. 7.

20 Final Centro Workshop Report, pp. 11–12.

> recovery and maintenance for the Great Southern Reef, with coordination of activities to manage the impacts/expansion of urchins and the development of clear policy which gives direction on urchin control strategies. It is essential that this funding consider the unique needs of Centro control and management in Tasmania, Victoria and New South Wales, with consideration given to the various sectors and rights-holders.[21]

4.28 The Workshop also identified opportunities for industry, including the demand for urchin products as a luxury foodstuff, and other commercial prospects.[22]

Establishment of the Centro Task Force

4.29 A key outcome of the Workshop was the establishment of a Task Force comprising of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the FRDC, and representatives of three state fisheries agencies—the Victorian Fisheries Authority, Marine Resources within NRE Tas, and the Fisheries section within NSWDPI.[23]

4.30 The aim of the Task Force was to establish a business plan for collaborative management of Centro. In September 2023, the Task Force finalised a five-year plan, which it provided to the committee. The plan made three Priority Recommendations:

4.31 The Plan was the result of:

> … consultation meetings with over 30 stakeholders in June, July and August [2023]. These meetings, coupled with findings from the National Centrostephanus Workshop in February 2023, have gleaned insights into the collective need for co-ordinated national management across all three States and adjacent Commonwealth waters, as a matter of urgency.[24]

4.32 The Task Force set out the purpose of the Plan as follows:

> The Plan reflects the key aims, actions and priorities required to drive a unified national approach to tackling the varying challenges presented by Centro across its range.[25]

4.33 It includes a Mission statement that emphasises the need for collaborative action in both environmental management and commercial development:

> Work collaboratively to deliver targeted longspined sea urchin management activities to protect and rehabilitate the ecological integrity and productivity of the Great Southern Reef, support the cultural heritage and traditional

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21 Final Centro Workshop Report, p. 4.

22 Final Centro Workshop Report, pp. 14–15.

23 National Centrostephanus Management Business Planning Flyer, p. 1.

24 Centro Task Force, *Business Plan*, September 2023, p. 6.

25 Centro Task Force, *Business Plan*, September 2023, p. 6.

> values of Sea Country, and create sustainable and prosperous commercial opportunities for industry and communities.[26]

4.34 The need for a shared strategy and appropriate funding was drawn out more fully in the Plan:

> Effective management requires a coherent strategy and appropriate level of financial commitment to support both strategy development and "in the water" control efforts over a meaningful time frame. Well-targeted efforts can generate a significant economic return for fisheries, tourism and related marine industries and their dependent coastal communities, as well as promote the recovery of ecologically critical species such as kelp, and economically important species like abalone and rock lobster, whilst also improving the long-term resilience of marine habitats.
>
> Stakeholders are committed to the development of a new nationally coordinated Centro strategy which respects the different cultural, ecological and economic factors that influence Centro management objectives across all jurisdictions. They stressed the need for improved political alignment, coordination, commitment, cross jurisdictional funding, and continuity of the investment …[27]

4.35 The Task Force recognised that the strategies developed from Centro management could benefit future management of other species that expand their ranges:

> Such coordination will also inform future responses to other range-extending species that cause ecological shifts, as such extensions are only expected to increase with climate change.[28]

4.36 The Plan also noted that approaches would differ between jurisdictions, recognising that 'the starting point, values, and requirements for each region differ, and the approaches developed and employed through this program need to be flexible enough to accommodate these differences'. The overall approach, however, 'will be unified and strategic under one business framework'.[29]

Business Plan Outcomes

4.37 The expected outcomes of the Task Force's Plan are:

- Reduced urchin barrens leading to thriving reef ecosystems.
- Improved reef health, marine ecosystems and Sea Country which is valued and utilised by community.
- Aboriginal people involved with management of sea country and benefit from urchin control. [and]

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[26] Centro Task Force, *Business Plan*, September 2023, p. 7.

[27] Centro Task Force, *Business Plan*, September 2023, p. 9.

[28] Centro Task Force, *Business Plan*, September 2023, p. 9.

[29] Centro Task Force, *Business Plan*, September 2023, p. 9.

- Successful and supported fisheries, with national and international markets.[30]

4.38 The Plan does provide more granular detail of what these outcomes entail under the following themes:

- Centro Population Management;
- Structured Fishing Effort;
- Improved climate resilience;
- Ecosystem Rehabilitation;
- Productive Utilization of Urchin Waste;
- Balancing Harvesting and Economic Opportunities;
- Local Capacity Building;
- Sea Country Protection;
- Community Engagement; and
- Consistency Across States.[31]

Task Force Action Areas and underlying principles

4.39 To realise these outcomes, the Task Force identified four 'Action Areas', which are each broken down into more defined 'Priority Actions'. The headline Action Areas are:

- Reef Monitoring and Modelling
- In-Water Centro Control and Rehabilitation Strategies
- Support Harvesting and Processing [and]
- Management of Sea Country[32]

4.40 In addition, the Task Force identified four 'Pillars', principles that should underpin all activities undertaken in the Action Areas.

4.41 The following section provides an overview of these Action Areas and supporting Pillars, noting that the Plan is found at Appendix 3, and also available on the committee's website.

Action Areas

4.42 The Task Force report states that four key Action Areas were identified as 'core to the national management of Centro, and delivery against these will form the basis of the plan'.[33]

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30 Centro Task Force, *Business Plan*, September 2023, p. 25.

31 More detail on these outcomes is provided in the Centro Task Force, *Business Plan*, September 2023, p. 25.

32 More detail on the 'Priority Actions' can be found in Centro Task Force, *Business Plan*, September 2023, p. 7.

33 Centro Task Force, *Business Plan*, September 2023, p. 10.

4.43 These were distilled from more than 90 suggestions put forward by stakeholders in consultation for the Plan. Final selection of the priorities was made based on what would be 'best value and highest impact' at the national level, as well as gaps in current investment.[34]

Action Area 1: Reef monitoring and modelling

4.44 The Task Force Plan notes that coastal water temperatures around south-eastern Australia have increased by two degrees Celsius over the past 100 years.[35] Moreover, it suggests that adaptive and robust monitoring, modelling and control strategies will enable informed decision-making and proactive management as climate-related impacts continue.

4.45 This priority Action Area includes determining historical reef baselines across the Centro distribution in order to:

- define desired reef state;
- developing standardised reference surveys, maps and models of Centro abundance to determine priority control areas;
- developing sustainable fishing and density benchmarks and guidelines for reef reporting;
- partnering with Aboriginal people to develop management strategies; and
- review and utilise marine spatial planning and other tools to develop a national approach to management and guiding priority areas of investment.

Action Area 2: In-water Centro control and Rehabilitation strategies

4.46 The Plan highlights that a key aspect of Centro control should be 'targeted in-water diver control and mitigation strategies' to protect habitat and restore reef ecosystems, as well as rebuild natural predator populations, given that extensive barrens are very difficult to rehabilitate once formed.[36]

4.47 The Plan notes that this could take the form of developing strategic harvest strategies that utilise commercial divers, volunteers and recreational divers undertaking removal and harvesting in priority control areas, or Sea Country Rangers undertaking Centro control as part of Sea Country Stewardship.[37]

4.48 It is suggested that activities in this Action Area could also include a review of policy and practice in relation to protected areas, catch targets, stock rebuilding practices (of Centro predators), and the development of a Tri-State incentivised fishing strategy.[38]

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34 Centro Task Force, *Business Plan*, September 2023, p. 10.

35 Centro Task Force, *Business Plan*, September 2023, p. 12.

36 Centro Task Force, *Business Plan*, September 2023, p. 14.

37 Centro Task Force, *Business Plan*, September 2023, p. 14.

38 Centro Task Force, *Business Plan*, September 2023, p. 15.

Action Area 3: Support harvesting and processing

4.49 As noted earlier, unlike many other over-abundant marine species (such as the crown-of-thorns starfish), Centro presents an economic opportunity as an emerging fishery for the Australian and International premium seafood market.

4.50 Stakeholders consulted in the development of the Plan suggested that support is needed to ensure that processing facilities are commercially competitive and innovative. Specifically, support is needed to:

> … adhere to eco-friendly principles, minimize waste, adopt innovative processing techniques, staff recruitment, training and retention, establish value-added products, value-added food products, use of waste (the potential of synthetic biology etc), and encourage / enable more innovative use of all of the components of the urchin.[39]

4.51 The Plan also suggests that this be accompanied by a strategic communication campaign that positions Centro as a luxury food while also considering the negative impacts of its southern range expansion, and its status as native species in NSW.[40]

4.52 Additionally, it notes that this industry needs a strategy to support research, development and investment in circular economy activities, including into value-added Centro products beyond traditional seafood, for example potential use in cosmetics, pharmaceuticals and aquaculture feed.[41]

Action Area 4: Management of Sea Country

4.53 The Plan states that:

> Sea Country in the Great Southern Reef region holds immense significance for Aboriginal people, encompassing not only the physical waters but also the spiritual and cultural connections woven through generations. The waters of the Great Southern Reef are repositories of knowledge, identity, and tradition, intertwined with culture and way of life.[42]

4.54 In the Task Force's consultation and engagement with Aboriginal people, the immense impact of Centro's range expansion on Sea Country was apparent. The Plan emphasised that this could only be addressed through a nationally coordinated management approach that is 'inclusive, recognises the stewardship rights of Aboriginal people and works to Close the Gap by providing employment opportunities'.[43]

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39 Centro Task Force, *Business Plan*, September 2023, p. 16.

40 Centro Task Force, *Business Plan*, September 2023, p. 16.

41 Centro Task Force, *Business Plan*, September 2023, p. 17.

42 Centro Task Force, *Business Plan*, September 2023, p. 18.

43 Centro Task Force, *Business Plan*, September 2023, p. 18

4.55 As part of this Action Area, the Plan highlights the need to ensure that Aboriginal organisation are effectively represented in the Southern Centro Advisory Group that the Plan proposes. Moreover, it suggests that Sea Country Restoration projects will need to be developed and supported, as will Aboriginal community-controlled post-harvest production opportunities.

4.56 The Plan also notes that culturally led training programs, and study and career pathways will be a component of this Action Area to ensure opportunities for Aboriginal entry into the commercial fishery and management of the resource outside of traditional fisheries.[44]

4.57 The plan also sets out four 'pillars for success' that would underpin the Action Areas, namely:

> **Research and Development:** Knowledge to underpin a national management approach.
>
> **Communication and Community Engagement:** Strategic communication and engagement to ensure stakeholders are supportive of Centro management approaches, the product and opportunities for engagement in stewardship of the GSR [Great Southern Reef].
>
> **Collaborative National Approach:** Robust partnerships with state fisheries agencies, local, State and federal government departments, research institutions, industry stakeholders, Traditional Owners, and coastal communities to drive the implementation of national management.
>
> **Policy:** Development / review of cross jurisdiction policies that promote cross sector collaboration and efficient Centro control.[45]

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44 Centro Task Force, *Business Plan*, September 2023, p. 19.

45 Emphasis in original, see Centro Task Force, *Centro Business Plan*, September 2023, p. 10.

Funding and indicative budget

4.58 The Task Force costed the implementation of its Plan at $55 million over five years. The most significant component of this is $30 million over five years for in-water Centro control and rehabilitation. Importantly, this Action Area funding component will be leveraged by State and private investment. The Plan's overall budget is broken down in Table 4.1.

Table 4.1: Indicative budget of the five-year Centro management plan

ACTION AREA	INVESTMENT DESCRIPTION	TOTAL 5 YEAR INVESTMENT
Action Area 1: Reef Monitoring and Modelling	$6M for Ecosystem Monitoring and Modelling which includes baseline surveys, density target development and marine spatial data monitoring.	$6M
Action Area 2: In-Water Centro Control and Rehabilitation Strategies	$30M for in In-water control to support the development of targeted and spatially optimal harvest strategies, commercial and Aboriginal fishery development / removal programs, recreational stewardship, etc. Also support for select rehabilitation and stock rebuilding strategies. *** Note the breakdown equates to $10M per state (NSW, Tas, Vic) over 5 years. Average spend of $2M per year. This will be leveraged by State and private investment.*	$30M
Action Area 3: Commercial Industry Support	$8M to drive innovation in processing, market development, business support.	$8M
Action Area 4: First Nations Support	$2.5M to support the establishment of Sea Country Restoration projects. Note leverage to Action Area 1 to support baseline surveys and monitoring and Action Area 2 to support harvest strategies and restoration.	$2.5M
Research and Development	$4M to drive key research priorities, planning, deep water and monitoring.	$4M
Community Engagement & Communication	$2M for implementing communication and stakeholder engagement, marketing and trade development	$2M
National Management, Planning and Policy	$2.5M for Secretariat, Task Force and Advisory Committee coordination and management of National Plan activities	$2.5M
		$55 million

Source: Centro Task Force, Longspined Sea Urchin: Towards a national five-year business plan for collaborative management, September 2023, p. 24.

Committee view and recommendations

4.59 This report has examined the shift in range of the long-spined sea urchin, Centro, from its native NSW marine environment, down the east coast of Australia through Victoria and Tasmania. As well as the substantial challenges this poses to the health of ocean ecosystems, and species that fisheries depend upon, it has also considered opportunities to develop new markets and industries for urchins, particularly as a premium foodstuff.

4.60 The scale of the damage caused by this invasive marine pest is unprecedented, and an important and timely sign of future range shifting invasive species. Changing environmental conditions are predicted to translate to more marine species moving into new habitats, and altering the fundamental balance of many marine ecosystems and the communities and businesses that depend on them.

4.61 Compelling evidence suggested that Tasmania has already lost 30 percent of its productive east coast reefs to the spread of invasive long-spined sea urchins, with swathes of critical habitat laid barren of the biodiversity critical to our marine life and fisheries. Scientific modelling projects that by 2050, half of Tasmania's reefs will be depleted if immediate action is not taken on managing Centro populations.

4.62 In New South Wales and to a lesser extent Victoria, the presence of long-spined sea urchins has long been considered a natural facet of marine ecology. But things are changing. Range extension and urchin population explosion brings the very real risk that Centro will become a damaging presence, rather than simply a natural part of the east coast marine ecosystem. It is clear that proactive management will be needed to mitigate the risk to coastal communities of NSW, Victoria and Tasmania.

4.63 However, it is clear from evidence that there are also significant opportunities from Centro's expansion. Most significantly, as a premium foodstuff. Centro harvesting could run alongside and supplement environmental restoration programs, to create a new fishery industry, larger domestic and export markets for urchins, and more regional employment.

4.64 As outlined in earlier chapters of this report, there is considerable evidence that an investment in a new Centro fishery would create many new jobs in the communities along the south-eastern seaboard of Australia. This includes additional jobs in processing and harvesting, in environmental management, including for regional and First Nations communities. The committee has made a recommendation regarding this, in chapter 3 of this report.

4.65 This is a rare win-win situation for the environment and industry.

4.66 This report has also built on the work of the Centro Task Force, which outlined a potential model for the Commonwealth to work collaboratively with states and other stakeholders, to effectively address these challenges, while also making the best of the opportunities.

4.67 Alongside the Task Force's work, evidence to this inquiry more broadly also showed strong support for the adoption of a collaborative model for Centro management. This would bring in the Commonwealth and state governments together to work proactively with stakeholders from industry, environmental, First Nations and community groups.

4.68 The findings of this inquiry open a window on the very tangible and real ways that climate change is impacting our unique marine ecosystems. It also reveals solutions, offering methods of mitigation that are both manageable and sustainable.

Recommendation 2

4.69 The committee recommends that the government consider making an immediate national investment into Centro control, guided by the Centro Task Force Plan's action areas and goals.

Recommendation 3

4.70 The committee recommends that the government consider the continuation of the Centro Task Force to govern the national investment delivery, and drive coordination, implementation, and reporting.

Recommendation 4

4.71 The committee recommends that the government consider the establishment of a Centro Advisory Group led by the Commonwealth, to include representatives from Aboriginal community-controlled organisations, industry, researchers, commercial dive, processing and the recreational dive sector, to provide guidance, co-design, coordination and delivery of actions at a state and regional level.

Senator Peter Whish-Wilson
Chair

Coalition Senators' Additional Comments

1.1 Coalition Senators are pleased to be able to broadly support the content of the committee's report.

1.2 This inquiry was conducted in a genuinely cooperative, multipartisan spirit, and we were happy to be able to work in a collegial fashion with our parliamentary colleagues in exploring the issues and potential solutions that arose.

1.3 We were also struck by the unanimity of the views of the overwhelming majority of the stakeholders that lodged submissions to the inquiry and attended the hearings. We should add that we sincerely appreciated the efforts of all of the individuals and organisations that established the Centro Task Force and convened the National Centrostephanus Workshop in early 2023 in order to specifically help inform the work of the inquiry.

1.4 In short, there is widespread agreement about the challenges, and the best responses to them, in dealing with the spread along the Great Southern Reef of climate-related marine invasive species, particularly long spined sea urchins (*Centrostephanus rodgersii*).

Comments on the implementation of this report's recommendations

1.5 We also think it is important, however, to make some more pointed observations in relation to the potential implementation of these recommendations.

1.6 As stakeholders consistently told us during the course of this inquiry, the attainment of the best and the most meaningful outcomes in this area will hinge (more than anything else) on genuine direction and leadership. Ideally, in the views of most stakeholders, this should be provided by Australia's national government—and it should be underpinned by well-meaning and well-resourced cooperation with the State Governments of New South Wales, Victoria and Tasmania.

1.7 In turn, that prompts us to make a number of comments in relation to the current Federal Government.

A change of government culture required

1.8 It does not please us (especially at the end of such an apolitical inquiry) to have to say that the optimal outcomes in this field will only be achieved if there is a very substantial change of culture within the Albanese Government.

1.9 Over the past 18 months, Australia's fishing and broader marine industries have been exposed to a perfect storm of pressures. These have included the spread of marine seismic surveys, carbon storage, bans on different kinds of fishing and netting, and offshore wind farms.

1.10 Yet these difficulties have been exacerbated by a lack of support, will and leadership from the two most relevant Federal Ministers, the Environment Minister, the Hon Tanya Plibersek MP and the Minister for Agriculture, Fisheries and Forestry, Senator the Hon Murray Watt. Repeatedly, the views of key figures (including highly experienced and knowledgeable fishers) are being ignored in funding decisions, law changes, and policy development and implementation.

1.11 This has been exemplified in a variety of ways. Foremost among them have been the government's failure to seriously consult (let alone to act upon the views of) people with longstanding, practical, professional experience on matters such as the expansion of marine parks and the imposition of new quotas and bans on certain forms of fishing.

1.12 At a Senate Estimates hearing of 24 October 2023, we were especially shocked to hear Senator Watt repeatedly imply that it was not his job to concern himself with issues like the devastation currently being inflicted on the commercial fishing industry as a result of gillnet bans in Queensland. In short, he asserted that his involvement (or even the involvement of his Department) would be a misallocation of resources, as he believed that it was predominantly a state concern.[1]

1.13 Ms Plibersek has also apparently failed to even reply at all to requests for basic meetings on these issues.

1.14 Given that background, our hopes are not high that these two Ministers will want to play an especially proactive role in relation to the issues spanned by this inquiry. We would nevertheless urge the full Albanese Ministry to take these matters seriously, and to step in and provide the leadership that is now demanded.

New funding and initiatives for Centro management and coordination

1.15 In the first instance, and as is outlined among the report's recommendations, the government could specifically begin this work by immediately injecting new funding into Centro control. This could be followed by the broadening of the Commonwealth's existing framework for dealing with invasive marine pests, and by the formation and/or continuation of task forces and other advisory groups.[2]

1.16 Within the Coalition, we are not wedded to a particular view of how these advisory positions and bodies should be configured—and respect the fact that different witnesses to the inquiry had varying views of what might work best in

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[1] See the discussion on this matter at Rural and Regional Affairs and Transport Legislation Committee, *Estimates Committee Hansard*, 24 October 2023, pp. 64–66.

[2] As canvassed by the committee at the hearing of 3 February 2023, *Committee Hansard*, 3 February 2023, throughout but see in particular pp. 52–56.

this sense. Complementing the general support for the idea of the creation of advisory bodies, for instance, some organisations were attracted to the prospect of the appointment of individual industry representatives or envoys.

1.17 In our view, each of these ideas deserves serious consideration.

1.18 Alternatively, if the Albanese Government remains averse to assuming responsibility, then they might be well advised to adopt a solution presented by Nature Conservancy Australia:

> It may not necessarily be Federal Government that is the leader; it may be Federal Government working in partnership with the lead agency to provide that oversight and coordination. It needs somebody that has the experience and the opportunity to bring those partnerships together.[3]

1.19 Equally, the Federal Government may want to take up the option of devolving or delegating the leadership role to one of the state governments.

1.20 Whoever does end up assuming that role, though, they need to ensure that funding, advice and activity is well coordinated and organised across the multiple jurisdictions. Similarly, and as Sea Urchin Harvest stated in its submission, various benefits would be likely to be derived from more extensive data collection—including through a reef baseline survey and a sea urchin biomass survey.[4]

1.21 To date, arguably the greatest impediment to success in the limiting of the spread and proliferation of marine invasive species has been that quite differing approaches have been used in the various states.

1.22 This was a point best articulated by the Fisheries Research and Development Corporation (FRDC), who remarked that 'all relevant stakeholders and jurisdictions will need to collaborate so that actions are more effective and not done in isolation'. The FRDC added that sea urchin removal must be undertaken in a form that promotes the harvesting for the roe market while also facilitating targeted culling in areas that would not otherwise be commercially viable—and therefore suitably balances ecosystem restoration and commercial fishing objectives in the process.[5]

1.23 In Tasmania, there has been significant investment through the State Government and the abalone industry—but, in New South Wales and Victoria, this has been lacking. There have likewise been too many regulatory barriers in existence.

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3 Dr Fiona Valesini, Director, Oceans Program (Australia), Nature Conservancy Australia, *Committee Hansard*, 3 February 2023, p. 50.

4 Sea Urchin Harvest, *Submission 15*, p. 4.

5 Fisheries Research and Development Corporation, *Submission 36*, p. 12.

1.24 Among a range of consequences, this lack of funding and regulatory pressure has also led to a lack of viability for the harvesting of urchins in particular areas. A number of submissions to the inquiry—such as from the Tasmanian Seafood Industry Council, Tasmanian Commercial Divers' Association, Tasmanian Abalone Council and Tasmanian Rock Lobster Fishermen's Association—noted that strategic harvesting, inclusive of scientific monitoring, by commercial divers is actually the only long term, cost effective and realistic control strategy for the Centro urchin problem in certain regions, including on the east coast of Tasmania. Those groups added that these activities will only continue to occur where there is certainty of harvestable product.[6]

1.25 As Hayes Seafoods indicated in its submission, it follows that there are also several complex challenges around quotas and licences that need to be carefully contemplated.[7]

Australian expertise in research and institutions

1.26 Importantly, though, many of the likely preconditions to success are already in place. In large part, this is because there is now a sufficiently long and detailed history of work on Centro control in Australia as to have crystallised the forms of action that are typically the most effective (and ineffective).

1.27 Above all else, Australia also now vitally possesses a critical mass of expertise in this field at both an individual and organisational level.

1.28 A number of those experts participated in this inquiry, and we were privileged to tap into their knowledge and insights. It should be added that their contributions to identifying and charting a course forward have already proved invaluable over many years. This has been especially true in Tasmania, where the relevant funding and programs (most notably the Abalone Industry Reinvestment Fund) have provided models for others to follow and have stimulated a range of significant accomplishments.

1.29 In essence, their dedication and hard work has shown us that there are myriad opportunities in this field to simultaneously deliver positive environmental and economic outcomes.

1.30 It is vital that these opportunities are now grasped.

1.31 Indeed, as politicians, we owe that end result to each of the contributors to this inquiry—and, more broadly, to all Australians.

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6 Tasmanian Seafood Industry Council, Tasmanian Commercial Divers' Association, Tasmanian Abalone Council and Tasmanian Rock Lobster Fishermen's Association, *Submission 39*, pp. 5–6.

7 Hayes Seafoods Pty Ltd, *Submission 2*, p. 1.

Senator Hollie Hughes
Member

Senator the Hon Jonathon Duniam
Member

Appendix 1
Submissions and additional information

1 Abalone Association of New South Wales
2 Hayes Seafoods Pty Ltd
3 Dr Kennedy David Wolfe
4 Eastern Zone Abalone Industry Association and Victorian Sea Urchin Divers Association
- Attachment 1
- Attachment 2

5 True South Seafoods
6 Parks Victoria
7 Department of Primary Industries and Regions (South Australia)
8 Australian Marine Sciences Association
9 Mr Matthew Clements
10 Seacare
11 Professor Michael Kingsford
12 Department of Agriculture, Fisheries and Forestry
13 Ms Emily McLaren
14 Mr Michael Baron
15 Sea Urchin Harvest Pty Ltd
16 Nature Coast Marine Group, Nature Conservation Council of NSW, National Parks Association of NSW and Coastwatchers Association
- 16.1 Supplementary to submission 16

17 OzFish Unlimited Ltd
18 Marine Life Network
19 Mr Wally Stewart
20 Urchinomics
21 Professor Adriana Vergés, Professor Peter Steinberg and Dr Ezequiel Marzinelli
22 Mr Jeremy Day
23 Professor Maria Byrne
24 Dr Benjamin Mos
25 Dr Craig Blount
26 Professor Symon Dworjanyn
27 Victorian National Parks Association
28 Australian Academy of Science's National Committee for Ecology, Evolution and Conservation Science
29 Dr Paulina Selvakumaraswamy
30 Tasmanian Government
31 Dr Nick Shears, Ms Kelsey Miller and Ms Celia Balemi

32 Department of Climate Change, Energy, the Environment and Water
33 New South Wales Aboriginal Land Council
34 The Nature Conservancy Australia
35 Great Southern Reef Foundation
36 Fisheries Research and Development Corporation
37 Australian Marine Conservation Society
38 Institute of Marine and Antarctic Studies
39 Tasmanian Seafood Industry Council, Tasmanian Commercial Divers Association, Tasmanian Abalone Council Limited and Tasmanian Rock Lobster Fishermen's Association
- Attachment 1

40 Tasmanian Seafoods Group
41 Blue Carbon Services
42 UnderseaROV
43 OceanWatch Australia
44 Tasmanian Aboriginal Centre

Appendix 2
Public hearings and witnesses

Friday, 3 February 2023
Hobart Function and Conference Centre
Marina Room
1 Elizabeth Street Pier

Hobart

Institute of Marine and Antarctic Studies

- Dr John Keane, Research Fellow
- Dr Scott Ling, Associate Professor, ARC Future Fellow
- Mr Julian Harrington, Chief Executive
- Mr Tom Chadwick, President
- Mr Darvin Hansen, Managing Director (via teleconference)
- Mr Mark Allsopp, Chief Executive Officer
- Mr Alvaro Maz, Special Advisor
- Mr John Alexander, Special Advisor
- Dr Cayne Layton, Director and co-founder

Great Southern Reef Foundation

- Dr Scott Bennett, Co-Director and co-founder

Marine Life Network

- Mr Michael Jacques, Coordinator

Sea Forest Foundation

- Dr Masayuki Tatsumi, Head of Research and Development

The Nature Conservancy Australia

- Dr Fiona Valesini, Direcor, Oceans Program (Australia)

Trowunna Culture

- Ms Fiona Hughes (via teleconference)
- Mr Jason Jacobi, Acting Secretary
- Dr Ian Dutton, General Manager - Marine Resources
- Dr Kate Watermeyer, Project Officer

Tuesday, 6 June 2023
Malmsbury 2 Conference Room
Mantra Tullamarine

Victorian Sea Urchin Divers Association

- Mr John Minehan, Treasurer
- Mr Cameron Armstrong, Secretary, Victorian Sea Urchin Divers Association Inc
- Mr Dale Winward, Ordinary Member, Mallacoota Sea Urchin Divers Association

Eastern Zone Abalone Industry Association

- Ms Helen Burvill, Executive Officer

Deakin University

- Dr Paul Carnell

Professor Stephen Swearer, Private capacity, Professor of Marine Biology, University of Melbourne and Director, National Centre for Coasts and Climate

OzFish Unlimited Ltd

- Mr Ben Cleveland, Senior program Manager - Victoria and Tasmania

Scuba Divers Federation of Victoria

- Dr John Hawkins, Vice President

VRFish

- Mr Craig Starritt, Dive Fishery Reference Group sub-committee

TARFish

- Ms Jane Gallichan, Chief Executive Officer

Victorian Government

- Mr Michael Irvine, Ranger Team Leader, Parks Victoria
- Mr Luke O'Sullivan, Director, Fisheries Management, Victorian Fisheries Authority
- Mr Michael Sams, Manager, Marine and Coastal Sciences and Programs, Parks Victoria
- Dr Kate Watermeyer, Project Officer, Marine Knowledge Team, Department of Energy, Environment and Climate Action, Victoria
- Mr Travis Dowling, Chief Executive Officer, Victorian Fisheries Authority

Fisheries Research and Development Corporation

- Dr Patrick Hone, Managing Director
- Dr Chris Izzo, Senior Research Portfolio Manager

Commonwealth Scientific and Industrial Research Organisation

- Dr Brett Molony, Science Director, Environment Business Unit

Wednesday, 7 June 2023
Maple Room
Swissotel Hotel, 68 Market Street

Sydney

Abalone Association of New South Wales

- Mr John Smythe, Secretary

Sea Urchin Harvest Pty Ltd

- Mr Chris Theodore, Chief Executive Officer
- Mrs Rachael Theodore, General Manager

Nature Coast Marine Group

- Mr Dane Wilmott, President
- Mr David Rowland

OceanWatch Australia

- Mr Simon Rowe, Program Manager

Mr Wally Stewart, Private capacity

New South Wales Department of Primary Industries

- Dr Rachel Przeslawski, Research Leader, Marine Ecosystems, NSW Department of Primary Industries (Fisheries)
- Dr Thor Sauanders, Director Fisheries Research, NSW Department of Primary Industries (Fisheries)

Professor Michael Kingsford, Private capacity

Professor Maria Byrne, Private capacity

Professor Peter Steinberg, Private capacity

Department of Climate Change, Energy, the Environment and Water

- Dr Fiona Fraser, Threatened Species Commissioner
- Ms Fiona Maguire, Division Head, International Environment, Reef and Oceans Division

Appendix 3
Report of the National Centro Task Force, Longspined Sea Urchin: Towards a national five year business plan (September 2023)

Longspined Sea Urchin

Towards a national five year business plan for collaborative management

SEPTEMBER 2023

THIS PROJECT IS SUPPORTED BY:

FRDC FISHERIES RESEARCH AND DEVELOPMENT CORPORATION
CSIRO
Victorian Fisheries AUTHORITY
Tasmanian Government
NSW GOVERNMENT Department of Primary Industries

In the spirit of reconciliation we acknowledge the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Date of Release: 18 September 2023

The Task Force has worked hard on developing this plan over the past months to ensure is reflects the needs of each jurisdiction and its stakeholders, and it considers existing industry, research, modelling, and monitoring projects. We welcome ongoing feedback or comments, as the Plan will remain agile. Please contact the report coordinator Belinda Cay, to share any additional ideas which can then be sent to the Task Force on: belinda.cay@agcommunicators.com.au

The Task Force consists of key national players as follows:

- Travis Dowling, CEO, Victorian Fisheries Authority (VFA)
- Dr Ian Dutton, General Manager – Marine Resources, Department of Natural Resources and Environment, Tasmania (NRE Tas)
- Dr Alistair Hobday, Senior Principle Research Scientist, CSIRO
- Dr Patrick Hone, Managing Director, Fisheries Research and Development Corporation FRDC)
- Dr Chris Izzo, Senior Research Portfolio Manager, FRDC
- Luke Osullivan, Director of Fisheries Management, Policy, Science and Licencing, VFA
- Dr Rachel Przeslawski, Research Leader, Marine Ecosystems – NSW DPI
- Sharna Rainer, Senior Fisheries Management Officer, NRE Tas
- Thor Saunders, Director Fisheries Research, NSWDPI
- Sean Sloan, Deputy Director General, NSWDPI
- Damian Young, Senior Fisheries Manager Commercial Fisheries, NSWDPI

Contents

Photo: Matt Testoni

Executive Summary

The southward range extension of the native longspined sea urchin (*Centrostephanus rodgersii*, or 'Centro') is a threat to to traditional values, marine biodiversity and the livelihoods of coastal communities in the eastern part of Great Southern Reef (GSR) region.

The Great Southern Reef covers 71,000 square km, and hosts significant marine biodiversity, supporting Australia's endangered Giant Kelp Forest communities, thousands of species of seaweeds, sponges, crustaceans, chordates, bryozoans, echinoderms and molluscs and contributes over AU $10 billion to the Australian economy annually (Wernberg et al. 2015, Keane and Ling 2022). This reef underpins the blue economies of NSW, Victoria and Tasmania and has sustained cultural wellbeing for more than 60,000 years.

The ecological functioning, health and productivity of the Great Southern Reef (GSR) is increasingly threatened by marine warming. Ocean temperatures throughout the East Australian Current are now 2 degrees warmer, which has facilitated the southward range-extension of Centro. Centro is endemic to NSW waters but has significantly extended its range and abundance over the past four decades through southern NSW, eastern Victoria and as far south as Port Davey in south-western Tasmania.

It is estimated that around 2,000 km of Great Southern Reef coastline, an area comparable to the length of the Great Barrier Reef (Verges et al. 2023), is now impacted by Centro overgrazing. This is evident in a vast expanse of barrens, grazed kelp beds and depleted reef-dependent species like abalone, rock lobster, and fish (IMAS, 2023). The transformation of kelp-reef habitats into urchin-barren rocky reefs also alters ecosystem services such as wave buffering and nutrient cycling, affecting the overall inshore ecosystem (FRDC, 2023).

The climate-driven southward range expansion of Centro is one of the largest and most immediate threats to kelp-dominated reef ecosystems in south-eastern Australia (Keane and Ling 2022). In fact, researchers state that 'across Australia's temperate reefs, no other benthic herbivore has as large an effect on shallow reef communities as the Longspined Sea Urchin' (e.g., Fletcher 1987; Andrew 1991; Andrew & Underwood 1992; Ling 2008; Keane and Ling 2022). For example, the flow-on impacts of over grazing have caused a local loss of over 150 species that live amongst Tasmanian kelp beds (Ling 2008, Keane and Ling 2022). Amongst these are significant commercial industries such as the Blacklip Abalone (*Haliotis rubra*; total annual gross value of production ~$50 million) and Southern Rock Lobster (*Jasus edwardsii*; total annual gross value of production ~$100 million) (Johnson et al. 2005; Strain & Johnson 2009; Johnson et al. 2011 cited in Keane and Ling 2023).

Centro also impacts Aboriginal people significantly. It's range expansion and invasion into Sea Country impacts and threatens cultural practices and spiritual/lore.

Centro populations in the South-east marine region of Australia, which encompasses Tasmania, Victoria, and the far south coast of New South Wales, are expected to continue to increase over the next 100 years (Davis et al 2023). Projections suggest that without a meaningful response, approximately half of all reefs in eastern Tasmania could become urchin barren grounds by the mid-2030s (Keane and Ling 2022).

To address this issue, the Centro Task Force proposes an immediate national investment of $55 million over five years into research, monitoring, modelling, removal (sustainable commercial and cultural removal, and harvesting) and processing opportunities, plus development of coordinated management, policy and communication. This investment aims to ultimately monitor, protect and rehabilitate marine habitats and culturally significant Sea Country, conserve natural capital, and boost socio-economic and ecological benefits.

The Centro Task Force, which is comprised of representatives from the three state fisheries agencies (the Victorian Fisheries Authority (VFA), Marine Resources – Department of Natural Resources and Environment Tasmania (NRE Tas) and NSW Department of Primary Industries – Fisheries (NSW DPI)), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Fisheries Research and Development Corporation (FRDC), has conducted consultation meetings with over 30 stakeholders inJune, July and August. These meetings, coupled with findings from the National Centrostephanus Workshop in February 2023, have gleaned insights into the collective need for co-ordinated national management across all three States and adjacent Commonwealth waters, as a matter of urgency. To guide this coordinated management, the Centro Task Force has developed this Business Plan (the Plan). The Plan reflects the key aims, actions and priorities required to drive a unified national approach to tackling the varying challenges presented by Centro across its range.

Through this plan, we will create a flexible and agile investment framework that allows tailored solutions to be applied at the regional level, considering the specific needs and challenges faced in each state and jurisdiction. Whilst the level of threat and risks posed by Centro differ greatly between each State and within specific areas of each State, the solutions will be most effective if unified. We recognise the importance of working together, bringing together representatives from state fisheries agencies, local, State and Federal government departments, research institutions, Aboriginal people, the dive and processing industry and community stakeholders.

We are committed to implementing rigorous research, including consistent approaches to monitoring and modelling, to gain deeper insights into the dynamics of the Great Southern Reef and its threatened kelp-dominated habitats, while supporting local stewardship initiatives in concert with a commercial urchin diving and processing industry. We will strike a balance between conservation efforts and economic prosperity, and have offered a plan which is agile and scalable allowing for the specific needs of each jurisdiction. The plan also emphasizes the importance of cultural values in marine conservation while incorporating community engagement for wider support and acceptance.

Priority Recommendations:

1) An immediate national investment of $55 million into Centro control, guided by this Plan's action areas and priorities.
2) Continuation of the national Task Force to govern the national investment delivery, and drive the coordination, implementation and reporting (via a small secretariat hosted by a Task Force member).
3) Establishment of a National Centro Advisory Group including representatives from Aboriginal community controlled organisaitons, industry, researchers, commercial dive, processing and the recreational dive sector, to provide guidance, co-design, coordination and delivery of actions at a State and regional level.

Our Approach

VISION

Our vision is that the diverse ecosystems of the Great Southern Reef supports the wellbeing of future generations.

MISSION

Work collaboratively to deliver targeted longspined sea urchin management activities to protect and rehabilitate the ecological integrity and productivity of the Great Southern Reef, support the cultural heritage and traditional values of Sea Country, and create sustainable and prosperous commercial opportunities for industry and communities.

AIMS	ACTION AREAS	PRIORITY ACTIONS
Identify and manage priority areas Monitor Reef recovery and measure impact Prevent Barren Formation Restore Sea Country Protect, Restore and Rehabilitate Reef Health Foster Sustainable Enterprises	1. Reef Monitoring and Modelling	1.1 Determine historical reef baselines (prior to ocean warming and predator exploitation) across the distribution of Centro to, where possible, define desired reef state. 1.2 Develop standardised reference surveys of urchin abundance, biomass surveys, mapping and modelling of historical baselines to identify national areas for priority control. 1.3 Develop sustainable fishing and density targets / benchmarks / abundance guidelines to inform decisions and establish a common framework for impact reporting for reef health. Partner with Aboriginal people to develop monitoring and management strategies, which recognise their knowledge and responsibilities to care for sea country. 1.4 Review and utilise marine spatial planning and other optimisation tools to develop a nationally integrated approach to management and guide priority areas of investment.
	2. In Water Centro Control and Rehabilitation Strategies	2.1 Develop strategic harvest strategies to manage Centro across Tas, NSW and Victoria. 2.2 Investigate targeted urchin removal for habitat protection and restoration of reefs of priority (as informed by Action Area 1). 2.3 Habitat restoration of biologically, culturally, and economically important areas to recover biodiverse and productive kelp forests. 2.4 Development of a Tri-State incentivised Centro fishing strategy.
	3. Support Harvesting and Processing	3.1 Support Centro processing businesses. 3.2 Explore the bottlenecks for expansion of the fishery where relevant. 3.3 Drive innovative whole of product use. 3.4 Drive new national and international markets for Australian Centro. 3.5 Support circular economy initiatives in processing businesses. 3.6 Support for State Industry Associations to deliver national Centro initiatives.
	4. Management of Sea Country	4.1 Ensure that Aboriginal organisations are effectively represented in the Southern Centro Advisory Group. Ensure that representative community controlled Aboriginal organisations are included. 4.2 Support the establishment of Sea Country Restoration projects, which support and recognise cultural obligations to care for Country and values knowledge. 4.3 Ensure opportunities for Aboriginal entry into the commercial fishery and management of the resource outside of traditional fisheries. 4.4 Establish training and capacity building programs centred around Centro removal.

Research and Development: Knowledge to underpin a national management approach.

Communication and Engagement: Building community awareness and acceptance.

Collaboration and National Approach: Robust partnerships and coordinated management.

Development / review of cross jurisdiction policies that promote cross sector collaboration and efficient Centro control.

OUTCOMES

Reduced urchin barrens leading to thriving reef ecosystems:

- Improved reef health, marine ecosystems and Sea Country which is valued and utilised by community.
- Successful and supported fisheries, with national and international markets.
- Aboriginal people involved with management of sea country and benefit from urchin control.

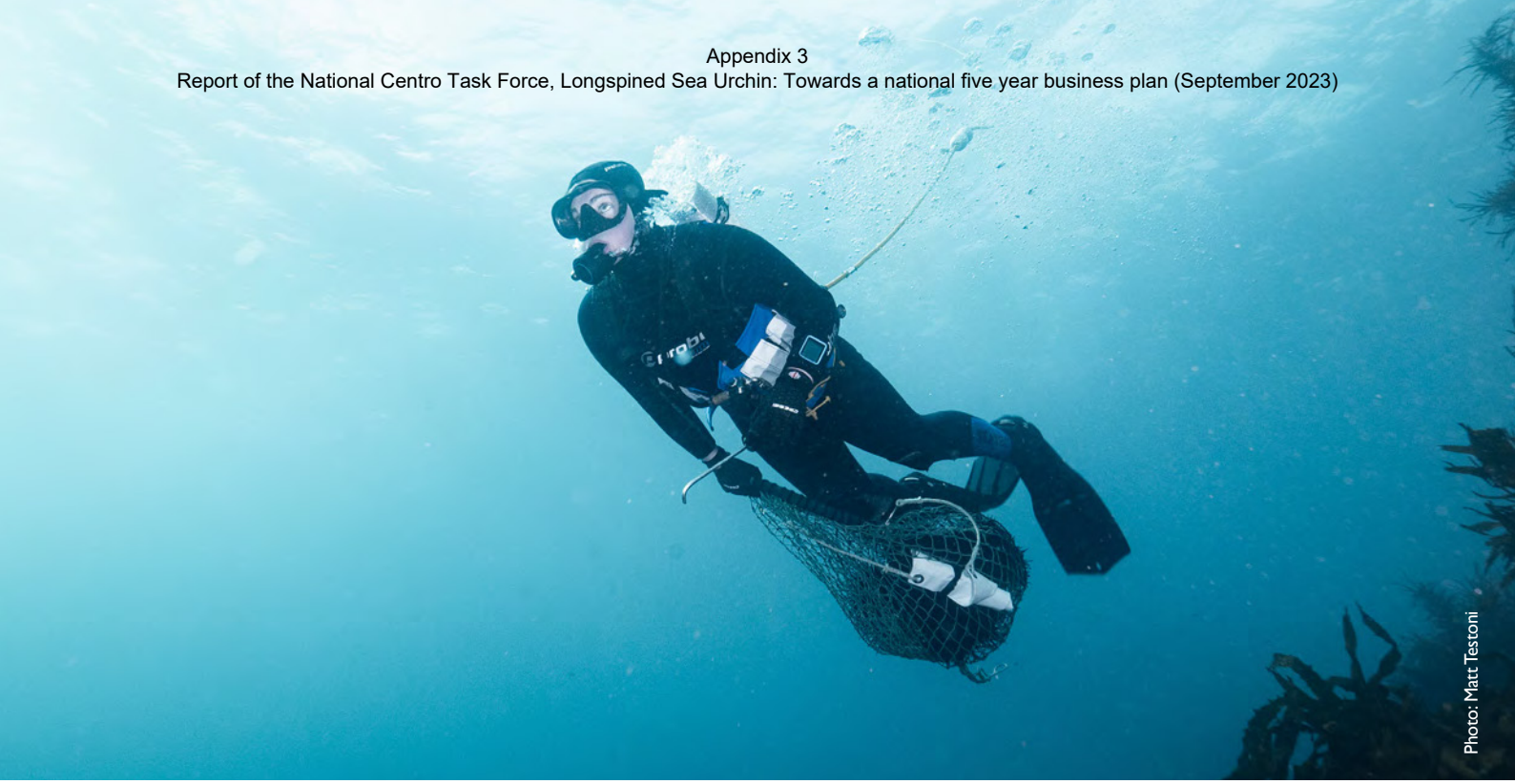
Photo: Matt Testoni

Background

This paper presents our Plan, and provides clear aims, priority actions and a pathway for effective management.

In February 2023, a National Centrostephanus Workshop was convened by NRE Tas, with co-sponsorship from the FRDC. The workshop brought together 130 representatives from industry, government, research, organisations, Aboriginal communities, recreational fishing groups, and the general community to:

- Identify challenges and opportunities related to Centro across regions.
- Identify the R&D gaps across the Centro range.
- Foster cross-jurisdictional and inter-sectoral relationships, as well as information sharing for improved management outcomes.
- Contribute to the design of a coordinated regional approach for the sustainable management of longspined sea urchin – the 'Regional Management Strategy'.

A key outcome of the Workshop was the commitment to establish a Centro Task Force comprising representatives of the three state fisheries agencies, the VFA, NRE Tas and NSW DPI, and the CSIRO and FRDC. A key role of the Centro Task Force was the development of this business plan (the Plan) for collaborative, best practice management of Centro. The Plan's charter was to reflect key actions and initiatives required to effectively monitor and manage Centro, and to identify research, projects and actions required to achieve improved coordination and management of Centro management across its native range in New South Wales and Victoria, and its extension into Tasmania.

The Task Force consulted and engaged with national stakeholders to gain input and feedback on management priorities and actions. All stakeholders were invited to be part of the consultation process. Over 30 consultation meetings with stakeholders including researchers, commercial divers, recreational divers, Aboriginal people, industry, and businesses were held to seek feedback, insights and recommendations for the development of the Plan. The submissions to the Senate Inquiry (which can be viewed online at: Climate-related marine invasive species – Parliament of Australia (aph.gov.au)) were also reviewed, along with the findings and feedback from the National Centrostephanus Workshop. This approach enabled the review of:

- The current state, and impact, of Centro range expansion.
- Marine ecosystem health across Tasmania, Victoria and NSW.
- Management and research needs to ensure marine ecosystem health across Tasmania, Victoria, and NSW.
- Potential controls and interventions to manage Centro densities below key ecological thresholds.
- Strategies to rehabilitate damaged ecosystems.
- Potential new markets for Centro as a food product.
- The need to support the dive and processing sector.
- The need to empower Aboriginal communities to manage Centro on sea country.
- Productive utilisation of waste from food processing.
- Governance, project co-design, communication.
- Risks, opportunities, actions and research priorities.

The costs of range-extending species, if unchecked, can represent a significant drag on local and regional economies. Effective management requires a coherent strategy and appropriate level of financial commitment to support both strategy development and "in the water" control efforts over a meaningful time frame. Well-targeted efforts can generate a significant economic return for fisheries, tourism and related marine industries and their dependent coastal communities, as well as promote the recovery of ecologically critical species such as kelp, and economically important species like abalone and rock lobster, whilst also improving the long-term resilience of marine habitats.

Stakeholders are committed to the development of a new nationally coordinated Centro strategy which respects the different cultural, ecological and economic factors that influence Centro management objectives across all jurisdictions. They stressed the need for improved political alignment, coordination, commitment, cross jurisdictional funding, and continuity of the investment. There was broad agreement that the lack of national funding was a major factor limiting more effective control. They also declared a need for political investment in ecosystem recovery and maintenance for the Great Southern Reef, with coordination of activities to manage the impacts/expansion of urchins and the development of clear policy which gives direction on urchin control strategies. Such coordination will also inform future responses to other range-extending species that cause ecological shifts, as such extensions are only expected to increase with climate change.

It is essential that this funding consider the distinctive needs of Centro control and management in Tasmania, Victoria and New South Wales, with consideration given to the various sectors and rights-holders. The Centro Task Force wish to acknowledge from the outset that the starting point, values and requirements for each region differ, and the approaches developed and employed through this program need to be flexible enough to accommodate these differences. Although Centro control practices and targets will vary from State to State – and indeed may vary between areas within a State – the overall approach will be unified and strategic under one business framework.

Did you know:

"The flow-on impacts of kelp bed overgrazing by this urchin are dramatic, with local loss of over 150 species that live amongst Tasmanian kelp beds (Ling 2008), which threatens parts of the lucrative fisheries for Blacklip Abalone (Haliotis rubra; total annual gross value of production ~$50 million) and Southern Rock Lobster (Jasus edwardsii; total annual gross value of production ~$100 million)".

(JOHNSON ET AL. 2005; STRAIN & JOHNSON 2009; KEANE AND LING 2022)

"Our community has a strong connection to Sea Country and a cultural responsibility to keep it healthy. We must participate in management strategies to control long-spined sea urchins, including through community-based management programs and the commercial fishery. We need to be involved so that our knowledge and people can help to avoid the collapse of our cultural resources, which are critical to our cultural practices, identity, and health."

**ANDRY SCULTHORPE,
LAND AND HERITAGE MANAGER,
TASMANIAN ABORIGINAL CENTRE.**

Plan Aims

Vision:

Our vision is that the diverse ecosystem of the Great Southern Reef support the wellbeing of future generations.

Mission:

Work collaboratively to deliver targeted longspined sea urchin management activities to protect and rehabilitate the ecological integrity and productivity of the Great Southern Reef, support the cultural heritage and traditional values of Sea Country, and create sustainable and prosperous commercial opportunities for industry and communities.

Plan Aims:

1. **Identify and Manage Priority Management Areas:** Identify priority management areas and implement targeted urchin management programs.
2. **Monitor Reef Recovery:** Continuously monitor and assess Centro range extensions and the outcomes of management activities.
3. **Prevent Barren Formation:** Mitigate Centro range extension and prevent the formation of new barrens in ecologically, socially and culturally important and productive reef areas.
4. **Protect, Restore and Rehabilitate Reef Health:** Reduce and recover existing Centro barrens in ecological, economic, social and culturally important and productive reef areas.
5. **Foster Sustainable Enterprises:** Grow sustainable and innovative Centro harvesting and processing businesses, which support ecosystem health and generate economic benefits for industry, and cultural and coastal communities.
6. **Restore Sea Country:** Empower and support Aboriginal people to manage Centro and barrens recovery in culturally significant areas using traditional knowledge and practice, and build, where appropriate and feasible, commercial businesses. This Plan also seeks to benefit Aboriginal people and communities, and help them fulfill cultural obligations and drive employment.

Action Areas

Four key management areas have been identified as core to the national management of Centro. These include:

- **Action Area 1:** Reef Monitoring and Modelling
- **Action Area 2:** In-Water Centro Control and Rehabilitation Strategies
- **Action Area 3:** Support for Harvesting and Processing
- **Action Area 4:** Management of Sea Country

Pillars for Success

Research and Development: Knowledge to underpin a national management approach.

Communication and Community Engagement: Strategic communication and engagement to ensure stakeholders are supportive of Centro management approaches, the product and opportunities for engagement in stewardship of the GSR.

Collaborative National Approach: Robust partnerships with state fisheries agencies, local, State and federal government departments, research institutions, industry stakeholders, Aboriginal representative community controlled organisations, and coastal communities to drive the implementation of national management.

Policy: Development / review of cross jurisdiction policies that promote cross sector collaboration and efficient Centro control.

Action Areas

Four key management areas have been identified as core to the national management of Centro, and delivery against these will form the basis of the plan. These key action areas include:

Action Area 1: Reef Monitoring and Modelling

Action Area 2: In-Water Centro Control and Rehabilitation Strategies

Action Area 3: Support for Harvesting and Processing

Action Area 4: Management of Sea Country

Within each action area sits a number of priority actions. It is important to note that over 90 actions were collected in the stakeholder engagement phase, and these were distilled by the Centro Task Force into 21 priorities. Stronger weighting was given to concepts which represented the best value and highest impact at the national level. Consideration was also given to gaps in delivery and current investment.

The success of these action areas will be underpinned by the pillars of:

Centro Research and Development: Knowledge to underpin the national management approach will be essential to effective management of Centro. Research and Development will inform the drivers of barren areas, priority areas for removal, habitat recovery, and restoration, and consider the approach to managing deep sea Centro populations.

Collaborative National Approach: Robust partnerships with state fisheries agencies, government departments, research institutions, industry stakeholders, Aboriginal representative community controlled enterprises, and coastal communities are essential to drive the implementation of national management.

Communication and Community Engagement: Strategic communication and engagement to ensure stakeholders are supportive of Centro management approaches, the product, and opportunities.

Development of Cross Jurisdiction: Examine current policies to consider conservation vs preservation approaches, and to generate a more cohesive habitat policy which is embedded into national Fisheries Policy.

Did you know:

"Of the approximately 77 marine range-extending species recently documented to have undergone climate-driven extension across Australia, the Longspined Sea Urchin is the most ecologically important due to its ability to overgraze kelp habitats and maintain an alternative and hyper-stable barren grounds"

(HILL ET AL. 2003; LING 2008, 2013; LING ET AL. 2009A; REVIEWED BY LING ET AL. 2015; BYRNE & ANDREW 2020 CITED IN KEANE AND LING 2023).

Action Area 1: Reef Monitoring and Modelling

About

Coastal water temperatures around south-eastern Australia have increased by 2 degrees Celsius over the past 100 years. This is three times the average increase in global ocean temperatures. This change has impacted southern-eastern marine ecosystems, altering habitats and species distribution. One of the major changes in species distribution has been the range extension of Centro, which now extends through southern NSW into eastern Victoria and as far south as Port Davey in Tasmania, and east from NSW into northern New Zealand. This has resulted in depleted kelp forests and seagrasses, increased disease and habitat shifts. Researchers now estimate that the ecological integrity of 2000 km^2 of the eastern part of the Great Souther Reef has been impacted.

Rationale

Establishment of adaptive and robust monitoring, modelling and control strategies which prioritise control methods at the local scale and then aggregate these regionally to deliver maximum value for money will be key to the delivery of all Actions. The use of nationally coordinated predictive models will inform annual work priorities. Priority must be given to build on work already undertaken by CSIRO on Centro control in Tasmania[1] e.g. population dynamics, distribution and movement of sea urchins, behavioural ecology, and forecasting future range expansion in a changing climate (e.g. Davis et al 2023). These tactics will enable informed decision-making and proactive management, will guide the setting of sustainable fishing and density targets, and demonstrate effectiveness of control options. Stakeholder engagement aligns with the views of the Task Force that:

- Preventing barren formation and reducing urchin density is essential, as once kelp forests are overgrazed they are hard to recover.
- There is a need to track the ongoing movement of Centro, and the impacted reefs considering weed edges, biomass and barren formation/expansion.
- Consideration of integrated ecosystem-based management approaches based on sound monitoring and modelling is essential to identify areas of priority management, with regards to ecological, societal, economic and cultural importance.
- There is a need to define what an achievable reef state is across the Great Southern Reef.
- There is a need to develop nationally consistent approaches to monitoring and modelling.
- Restoration and rehabilitation of priority areas of the Great Southern Reef and kelp forests are a priority.
- Modelling must consider stock and predator dynamics, removal strategies and ecosystem conditions, such as biomass, kelp, depth, location, and species mix (i.e. whole ecosystem modelling and flow-on effects of urchin control). .
- Modelling the stock dynamics and removal strategies will enable the testing of different management strategies before management actions are undertaken. This improved knowledge can help guide the efficacy of sustainable fishing and density targets, and demonstrate effectiveness of control options.

There is already a large body of research work that underpins our knowledge of appropriate and cost-effective management actions across the range of Centro. This action area would synthesise the existing data and learning from experience with this Plan to inform emerging research needs.

Photo: Matt Testoni

[1] Westcott DA, Fletcher CS, Chades I (2022) Strategies for the management of Centrostephanis rodgersii in Tasmanian Waters. CSIRO, Australia

Action Area 1: Priority Actions for National Management

	ACTION	CONSIDERATIONS
1.1	Determine historical reef baselines (prior to ocean warming and predator exploitation) across the distribution of Centro to, where possible, define desired reef state.	• Conduct strategic baseline / biomass surveys in NSW, Vic and Tas to develop clear reef baseline data, and understand the extent of barrens.
1.2	Develop standardised reference surveys of urchin abundance, biomass surveys, mapping and modelling of historical baselines to identify national areas for priority control.	• Development of standardised national monitoring techniques and protocols for data sharing across all organisations involved in this Plan. • Conduct monitoring and mapping to identify management priorities for areas with significant ecological, societal, economic and cultural importance.
1.3	Develop sustainable fishing and density targets / benchmarks / abundance guidelines to inform decisions for reef health and predator rebuilding.	• Develop national guidelines, including Target Reference Points for urchin abundances and acceptable extent of barrens habitat at appropriate spatial scales, encompassing the varied ecological/social/cultural/economic values across the urchin's endemic and extended ranges. Partner with Aboriginal people to develop monitoring and management strategies, which recognise their knowledge and responsibilities to care for sea country.
1.4	Review and utilise marine spatial planning and other optimisation tools to develop a nationally integrated approach to management and guide priority areas of investment.	• Define the areas which we want to avoid establishment at all costs. • Identify and prioritise high value reefs and ecosystems for management. • Define areas and approach for the targeted removal of urchins and priority locations considering functional importance, greatest risk of becoming barrens, and appropriate control approaches or provide the greatest return on investment. • Refine urchin removal practices to promote harvesting for the roe market (and other potential commercial uses) while also facilitating targeted removal in areas that would otherwise not be commercially viable – thus balancing ecosystem restoration and commercial fishing objectives. Consider stock dynamics, removal strategies and ecosystem conditions, such as biomass, depth, location, and species mix to inform the different management strategies, and ongoing impact.

Did you know:

Current "modelled projections of observed rates of Centro population increase and overgrazing indicate that unless there is meaningful response to this threat, half of all reefs in eastern Tasmania are likely to become urchin barren grounds by mid-2030s."

(LING & KEANE 2018)

Action Area 2: In-Water Centro Control Strategies

About

Key to the Plan and Centro control are targeted in-water diver control and mitigation strategies that limit the spread of Centro, prevent new barrens from forming, and prevent existing barrens from extending.

In-water control may take a range of forms – from commercial divers undertaking contracted removal or subsidised harvesting in priority control areas, through to volunteers and recreational divers operating under a code of conduct, or Sea Country Rangers undertaking Centro control as part of Sea Country stewardship.

Control must also consider the role of natural predators populations to limit incursions. When predators occur at naturally large levels, they can mitigate the incursion of sea urchins and overgrazing in the first place (Ling & Keane 2021). It is noted that predator rebuilding and active rehabilitation strategies can improve resilience.

Rationale

The implementation of targeted, in-water control and mitigation strategies to directly impact Centro populations is essential. Research shows that the productivity of commercial reef-based fisheries, and kelp-associated biodiversity can collapse once extensive barrens are formed (Keane and Ling, 2022) and extensive barrens are very difficult to rehabilitate, requiring drastic, maintained and expensive intervention to achieve kelp recovery at meaningful scales (Keane and Ling 2022). The overarching aim from the start must be to limit the formation of new barrens.

The type and intensity of in-water control methods that an area requires are best determined by considering the properties of the area. There is a need to formally identify and monitor priority at-risk areas, and to identify the areas of highest economic, social, cultural and commercial value across the States. These areas and the types of control most appropriate in each will be identified in regional control strategies such as the one developed by CSIRO for Tasmania (Westcott et al 2022), which also draws from the Great Barrier Reef experience) and the work conducted in Action Area 1.

Once identified and prioritised, areas can then be targeted for proactive action to prevent or mitigate barren formation by removing urchins, followed by remediation of barrens through rehabilitation activities such as kelp and biodiversity restoration including rebuilding urchin predator populations to limit re-incursions (Ling et al. 2009, Westcott et al 2022). This process needs to be underpinned by research and modelling which considers the impending impacts of climate change.

It is recognised that the commercial dive fishery and key partners in the processing sectors have been the primary means of controlling urchins in Tasmania, and that a subsidy (paid through the Abalone Industry Reinvestment Fund) was essential to incentivise the harvest and drive down urchin abundance. Harvesting programs, such as those initiated by the Tasmanian Abalone Council and Tasmanian Government in 2017/18, provide a low-cost product to processors, while effectively removing and rejuvenating reef ecosystems (and Abalone habitats). It also created a viable fishery and contributes to job and market creation.

Considering existing commercial dive programs it is suggested that fundamental to the success of In-Water Control actions will be providing support for divers, processors, aboriginal organisations and other entities involved. It is also important to support the commercial dive sector, and support Aboriginal participation in the commercial fishery (recogising the importance of this on job creation in remote areas, jobs on country and combines Aboriginal knowledge and responsibilities with commercial enterprise).

Feedback from stakeholders consistently agreed that it is especially important to build and support the commercial dive sector, as they are fundamental to providing a longer term in-water presence; a sustainable Centro fishery guarantees a level of in-water control into the future, subject to the economics of the activity.

Subsidies and other economic incentives (e.g., contracting for take-all harvests which remove all size classes, and not just processable sizes, of Centro) have been an essential management tool in Tasmania to direct effort, and similar incentivised models could be considered across Victoria and NSW if appropriate. Concern was raised that without economic incentives, the pace of processing and market developments will slow and restrict Centro fishing, allowing Centro numbers to thrive. Support for other forms of in-water control can also be developed, for example, by drawing on examples of successful incentivised recreational harvest building on existing targeted removal programs in Victoria and drawing programs like Caribbean Lionfish.

Did you know: *"In eastern Tasmania, the Longspined Sea Urchin has undergone a population explosion from first records of two positively identified individuals in 1978, to 11 million in 2002, to an estimated ~20 million in 2018."* **(LING & KEANE 2018).**

Action Area 2: Priority Actions for National Management

	ACTION	CONSIDERATIONS
2.1	Develop strategic harvest strategies to manage Centro across Tas, NSW and Victoria.	• Ensure the flexibility to enable each jurisdiction to place the necessary emphasis on aspects of most importance to each jurisdiction. • Review zones and protected marine habitats across states to determine areas where harvest can be expanded. • Review State and federal marine park sanctuaries and fishing grounds so zones can be developed up and down the coast where different strategies apply. • Review priority areas for Take-All harvests, and/or culling and consider the support required to implement these locally and regionally. • Consider approaches to stimulate and drive catch targets, where appropriate. • Review policy and facilitate Aboriginal Community control (protect, monitor, manage) in culturally significant Sea Country areas and marine parks, linking to Action Area 4. Subsidies should also target Aboriginal participation in the fishery and other control operations. • Consider current quotas and licencing arrangement across States.
2.2	Investigate targeted urchin removal for habitat protection and restoration of reefs of priority (as informed by Action Area 1).	• Prevent barren formation. • Remove Centro down below the ecological threshold so it is not deleterious to habitat formation.
2.3	Habitat restoration of biologically, culturally, and economically important areas to recover biodiversity, predator population and reestablish productive kelp forests.	• Consider stock rebuilding strategies. • Develop a restoration prioritisation strategy for reaching ecological targets at priority reefs or zones. This must consider multiple control options, i.e., harvesting coupled with kelp restoration and reseeding, and rebuilding native species populations such as lobsters and fishes at priority areas.
2.4	Development of a Tri-State incentivised fishing strategy.	• Consider expanding targeted harvest subsidies to reduce the degradation of significant habitats in Tasmania and Victoria, with consideration given to NSW once informed by mapping of populations to understand range extension and population densities. • Consider harvest subsidies nationally to enhance fisheries and/or spatially target problematic urchin populations.

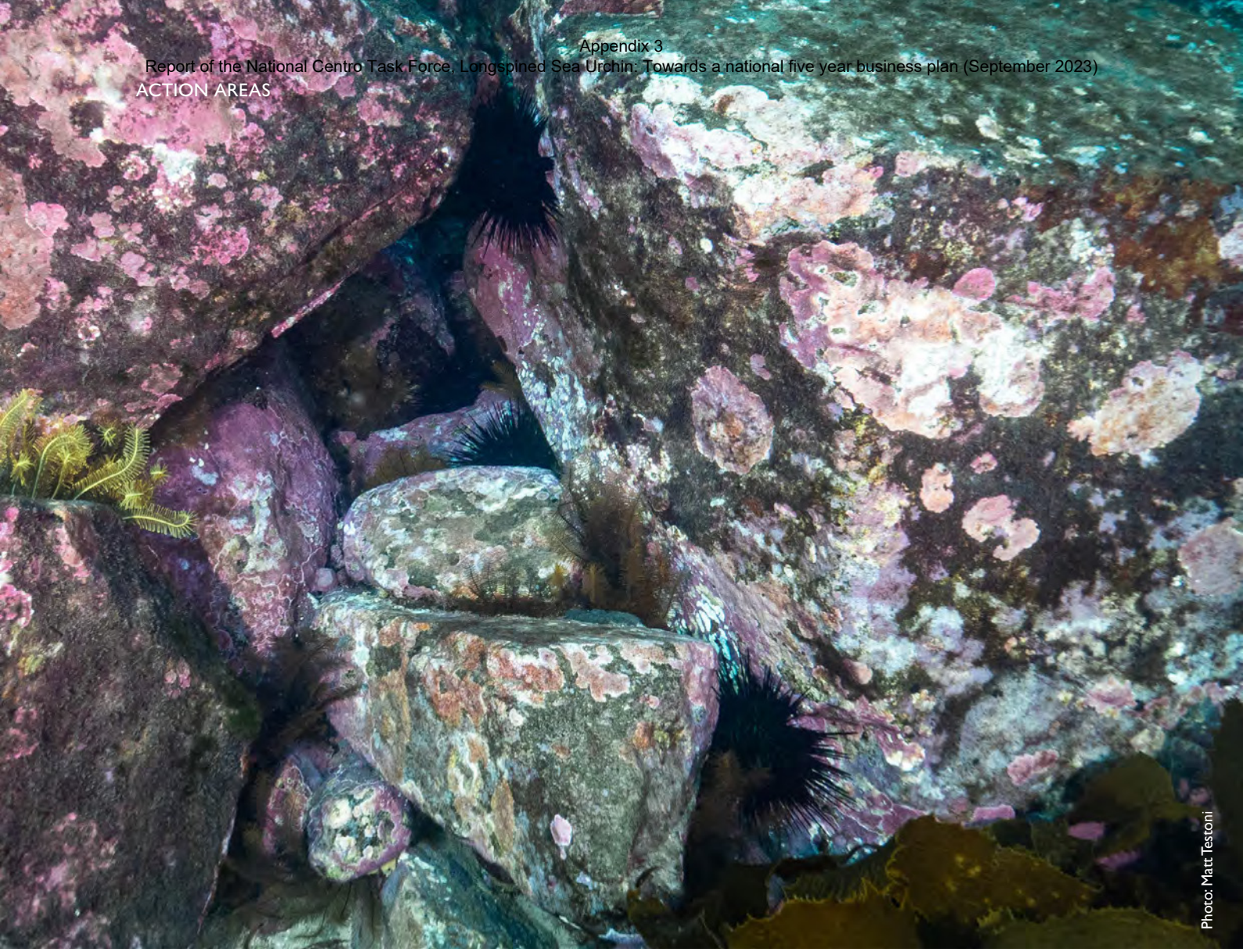

Photo: Matt Testoni

Action Area 3: Industry Support for Commercial Harvests and Processing

About

Unlike many other over-abundant marine species such as the Crown-of-Thorns Starfish on the Great Barrier Reef, Centro presents an economic opportunity. The successful harvest of Centro has created a new fishery which provides product to the Australian and international premium seafood market, delivering economic and employment benefits while reducing the overall impact of Centro on reefs and fisheries.

Rationale

During consultation with stakeholders, many provided strong feedback that support for processing facilities to be commercially competitive and more innovative is essential. Feedback suggested that support is needed to adhere to eco-friendly principles, minimize waste, adopt innovative processing techniques, staff recruitment, training and retention, establish value-added products , value-added food products, use of waste (the potential of synthetic biology etc), and encourage / enable more innovative use of all of the components of the urchin.

There is a significant opportunity to brand Centro as a luxury seafood product, and to expand its markets both nationally and internationally. Work is required to ensure the trade pathways and agreements are in place to support access to these markets. Support is also sought to drive training opportunities in compliance, safety, product development and value adding,

Participants expressed the need for a strategic communication campaign that positions Centro as a luxury food while considering the negative impacts of its southern range expansion, and its status as native species in NSW.

Action Area 3: Priority Actions for National Management

	ACTION	CONSIDERATIONS
3.1	Support Centro processing businesses.	• Support businesses to innovate, adapt and capitalise on the opportunities presented by Centro (i.e. product development, business innovation, staff recruitment and retention). • Consider a national approach to subsidies to help support businesses (i.e. generate an employment boost) until the sector is self-sustaining. • Drive commercial value chains. • Support for improvement in Centro logistics to maintain roe quality. • Support value adding opportunities that will expand the range of Centro roe products in consultation with processors. • Support for recruitment and training.
3.2	Explore the bottlenecks for expansion of the fishery where relevant.	• A strategy is needed to encourage more divers to enter the industry, i.e., support for workforce recruitment and training. • Support for licence holders / incentives for divers to target priority areas. • Support for ongoing training and professional development for Aboriginal people and commercial divers.
3.3	Drive innovative whole of product use.	• Continued research into the utlisation of centro waste into other applications - such as, but not limited to, fertiliser. • Encourage the development of value-added products from Centro, expanding its market beyond traditional seafood channels, such as cosmetics, pharmaceuticals, and aquaculture feed. • Conduct a desktop review of innovative waste utilisation. • Consider novel processing innovations such as onboard processing, noting biosecurity and waste management risks.
3.4	Drive new national and international markets for Australian Centro.	• Develop an international trade strategy which considers trade access, policy and relationships, market risks and opportunities for growth. • Conduct market research to identify domestic and international demand for Centro products, highlighting its potential benefits as a sustainable seafood choice. • Develop a product development strategy which builds Australian Centro as a luxury brand product.
3.5	Support circular economy initiatives in processing businesses.	• Support for processors to invest in circular economy activities i.e. support to reduce their carbon footprint, waste management, use of 100 % of Centro and explore linkages with relevant R&D initiatives.
3.6	Support for State Industry Associations to deliver national Centro initiatives.	• Consider the delivery of coordinated training in compliance, WHS, data tracking and reef management / monitoring. • Establish a group which helps collect and record diver observations on reef condition, urchin population densities and where removals and harvests should occur. Ensure representation on the National Centro Advisory Group. • Drive national networks and knowledge sharing.

Action Area 4: Management of Sea Country

About

Sea Country in the Great Southern Reef region holds immense significance for Aboriginal people, encompassing not only the physical waters but also the spiritual and cultural connections woven through generations. The waters of the Great Southern Reef are repositories of knowledge, identity, and tradition, intertwined with culture and way of life.

Engagement, inclusion and co-design with Aboriginal community controlled organisations is essential to the success of Centro control and ecosystem restoration in Sea Country. They have a longstanding knowledge of Sea Country and are keen to implement programs which honour culture, build young sea stewards, and generate employment opportunities through viable businesses and industry, such as dive and processing.

This action area presents opportunities to increase Aboriginal led management projects and programs. It presents opportunities to integrate traditional knowledge into national Centro management.

Rationale

Engagement with representative community controlled organisations and Aboriginal people reported that over-grazing by Centro is impacting Sea Country, cultural connections and activities. Many Aboriginal communities reported population declines in native *Elenchus* spp. maireener shells and seagrasses (both used in the creation of Aboriginal jewellery and customary items), altered ecosystems and impacts on native marine food species like abalone, lobster, and fish, plus an impact to social values and culture.

Engagement with Aboriginal people emphasised the immense impact Centro range expansion is having on Sea Country and stressed the need for nationally coordinated management which is inclusive, recognises the stewardship rights of Aboriginal people and works to Close the Gap by providing employment and access to commercial opportunities. It was also emphasized that national management must:

- Include Aboriginal people / Aboriginal representative community controlled organisations on the National Centro management committee(s) to ensure there is shared stewardship from the start.
- Create opportunities to bring together Aboriginal people from Tas, NSW and Victoria to drive collaborative Centro management and drives strategies/opportunities for building young Sea Stewards, the use of traditional removal and management practices (such as trapping), building commercial opportunities for Aboriginal businesses in partnership with the Indigenous Land and Sea Corporation and consider strategies for community control efforts.
- Review and consider policies which better enable Community to practice Centro control in Sea Country, and work on effective removal and restoration. This may include a review of regulatory and economic measures to support management in culturally significant regions.
- Create capacity building opportunities for Aboriginal people to connect with Sea Country through diving programs, training, and inclusion in research and industry initiatives including processing and marketing, plus restoration.
- Ensure both the Advisory Committee and Task Force appreciate the importance of holistic ecosystem management, thinking objectively about the sustainability of Sea Country and consider the ecosystem as a resilient living system.
- Explore opportunities to link Centro management with broader to the restorative programs delivered through the Great Southern Reef region.

Feedback was clear in that management needs to consider holistic management of the marine environment and ecosystem in partnership with Aboriginal people.

Action Area 4: Priority Actions For National Management

	ACTION	CONSIDERATIONS
4.1	Ensure that Aboriginal organisations are effectively represented in the Southern Centro Advisory Group.	• Ensure effective engagement, in planning and design of interventions at regional/State/local levels and in monitoring their effectiveness. • Ensure representatives from Aboriginal community controlled organisations. • Ensure engagement through the Community controlled representative organisations, and allocate and leverage funding support to ensure effective operation.
4.2	Support the establishment of Sea Country Restoration projects which support and recognise cultural obligations to care for Country and values knowledge.	• Conduct a feasibility study to support Aboriginal community controlled post-harvest production opportunities. This will work to investigate dive removal (considering licences and subsidies), processing opportunities in culturally important regions), training (of divers and processors) and market opportunities (local, national and international). • Centro population mapping around culturally important areas. • Explore developmental fishing methods, such as trapping supported by training opportunities (safety, dive techniques and habitat restoration and reseeding). • Develop platforms for effective data collection incorporating Aboriginal knowledge into the broader Centro modeling, monitoring and reporting systems. • Establish community removal and restoration projects which allow community to take Centro out of important Sea Country. Must consider the licence to operate, potential subsidies for regional access, and restoration.
4.3	Ensure opportunities for Aboriginal entry into the commercial fishery and management of the resource outside of traditional fisheries.	• Support Aboriginal community controlled enterprises to participate in the fishery and incentivise this with subsidies. • Establish new study and career pathways for Sea Country Stewards, working alongside research and Government agencies. • Address Closing the Gap – creating new industry opportunities potentially in partnershp with commercial operations and new investors such as the Indigenous Land and Sea Corporation.
4.4	Establish training and capacity building programs to facilitate Aboriginal engagement in Centro removal.	• Instigate culturally led training programs which address commercial dive, safe removal strategies, under water monitoring, reef restoration and maintaining the cultural integrity, health and commercial outcomes of Sea Country.

PILLAR 1:
National Research, Development & Planning

About

Investment in cutting-edge research to support and underpin Action Areas 1-4 is crucial and will help to better understand the drivers of Centro range expansion, its ecological impacts, and effective management strategies.

Ongoing research is essential to provide up-to-date information, improve our understanding of the Centro range expansion, barren formation drivers, and to develop effective conservation and management strategies to address potential ecological impacts.

This pillar considers priority research required to predict and respond to changes in marine ecosystems influenced by Centro range expansion.

Points to note

There is a growing body of work already contributing to our understanding of Centro across its range and into neighbouring New Zealand, where Centro is also a range-extended species originating from New South Wales. However, there is a need to collate and review the often State-based work to identify gaps and opportunities.

While this Plan has identified the gaps and priorities for national management, there is still a need to synthesize and collate all known research (some of which is not well known as it was conducted as part of Honours and Masters thesis), and identify further knowledge gaps and areas for extension. It is critical that design of future research be guided by the previous work and not duplicate effort. The Task Force will lead the synthesis of this review.

The following research projects are considered priority to underpin national management:

ACTION	CONSIDERATIONS
Development of a national management plan for climate-drive redistribution of marine species, which coordinates strategic management of Centro across jurisdictions.	• Review mapping and modelling to set assigned control measures to the reefs. • Identify priority management areas and implement informed urchin management programs, with monitoring of reef recovery.
Monitor Habitat Recovery	• Develop monitoring programs which track control efforts by location over time and enable reporting of Centro removal and habitat recovery habitat recovery post restoration. • Consider spawning, roe quality, and habitat functioning.
Research into automation or alternative management options for urchin control in deeper water.	• Review deep water habitat removal options. • Develop 3D models, barren data, quantification of kelp cover and review of harvest options considering post-harvest potential.
Research to inform divers of barren areas	• Consider predation, sea surface temperatures, larval dispersal, connectivity, colonisation approach, how to predict the level of risk under climate change (pollutants, run off, warming temp).

PILLAR 2: Community Engagement

A comprehensive and strategic approach to stakeholder engagement, public awareness campaigns, and transparent communication will support Action Areas 1-4.

Ownership and active participation in Centro management will be fostered in local communities, Aboriginal communities, fishing industries, environmental NGOs, and research organisations via engagement in regular workshops, forums, and community days.

Additionally, public awareness campaigns will be developed and implemented to educate the wider community about the significance of managing Centro, aiming to protect marine habitats and preserve cultural values while also promoting the benefits of urchin as a 'nature positive seafood'. Transparent communication channels will be maintained with stakeholders, ensuring updates on research findings, correct identification, monitoring results, and management actions are shared, with the goal of garnering societal acceptance and support for active reef management.

In New South Wales, OceanWatch ran a successful 'Ultimate Urchin Challenge' which offered the public a chance to get involved in the catch, culinary preparations, and tasting of Centro roe. Similarly in Tasmania, renowned local chefs have publicly prepared and served Centro roe at large community events and festivals, notably the Wooden Boat Festival 2023. Events such as these can inform future community engagement activities to raise the local profile of Centro roe and drive domestic demand.

ACTION	CONSIDERATIONS
Stakeholder Engagement	• Engage with local communities, Aboriginal people / Aboriginal community controlled organisations, fishing industries, environmental NGOs, and scientists through regular workshops, forums, and consultations to foster ownership and active participation an active online (website and social media) presence, in Centro management.
Public Awareness Campaigns	• Develop and implement public awareness campaigns that educate the wider community about the importance of managing Centro to protect marine habitats and preserve cultural values. Risks associated with removal campaigns must also be considered (e.g. Centro is just one urchin species of many).
Transparent Communication	• Maintain a suite of well targeted communication channels with stakeholders, providing updates on research findings, monitoring results, and management actions, fostering societal acceptance and support for active reef management.
Recreational Dive Sector	• Development of programs to underpin safe recreational harvest activities. • Promote urchins as a culinary target for recreational fishers. • Consider targeted harvest/ culling events in local areas around favorite dive sites/ culturally important reefs with a focus on education in terms of the different urchin species and safe practices for culling/ harvest. Recreational diver training in urchin control/ kelp restoration measures and voluntourism to be supported.

PILLAR 3:
Collaboration and National Approach: Robust partnerships and coordinated management

Robust partnerships with state fisheries agencies, government departments, research institutions, industry stakeholders, Aboriginal people / Aboriginal community controlled organisations, and coastal communities are essential to drive the implementation of national management.

The continuation of the Task Force is proposed in its current form to drive policy, oversee implementation of the plan, and govern the expenditure in compliance with any head agreement.

Clear feedback was received of the need to improve the national communication and linkages with Aboriginal people / Aboriginal community controlled organisations, the commercial dive sector, the processing sector and the recreational dive sector. It is proposed that an Advisory Committee Group be established with key representatives to drive great collaboration, implementation, and delivery.

The following principles were identified through the engagement process, and will thus form the basis of the Plan.

Principles for Collaborative Tri-State Operations

a) **Coordination:** It is proposed that a single organisation will provide the backbone for the delivery and implementation of the Plan. A Secretariat organisation will be established by the Centro Task Force to act as a focal agent, coordinate between the various implementing organisations and deliver all key knowledge sharing, contracting and reporting activities.

b) **Collaboration:** The Secretariat, under the direction of the Task Force, will prioritize and actively engage in collaboration with industry, Aboriginal people /Aboriginal community controlled organisations**,** community, government, and research entities throughout all stages of the project.

c) **Co-Design & Engagement:** Projects and activities will be co-designed in partnership with industry, government, Aboriginal people / Aboriginal community controlled organisations, community, and researchers, taking into account regional and local nuances to ensure comprehensive and inclusive decision-making.

d) **Best Available Science & Knowledge:** Informed decisions will be made by utilising the most reliable and up-to-date scientific and community-based knowledge, including insights from industry and Aboriginal people.

e) **Ecosystem & Reef Health:** All decisions and actions will be guided by the central goal of preserving and enhancing the optimal health, balance and resilience of the Great Southern Reef and its surrounding ecosystems.

f) **Sustainable Communities:** Decisions will acknowledge and recognise the Great Southern Reef's cultural heritage, and community significance, and ensure decisions consider the well-being of communities.

g) **Recognising and Respecting Distinctions:** The team will diligently acknowledge and respect the differences between the native and range-extension regions of Centro; in NSW, urchin barrens are broadly recognised as an established stable-state in most areas, whereas in Victoria and Tasmania the expansion of urchin barrens is causing loss of biodiversity and productivity. Understanding these distinctions will inform appropriate actions and measures for each context.

h) **Sharing knowledge:** Core to the success of this national approach to management will be sharing research, knowledge and best practice management information. Stakeholders are committed to open and transparent information sharing for the betterment of the Great Southern Reef.

PILLAR 4: Overarching Policy to Underpin National Centro Management

The development of cross jurisdictional policies will be essential to the success of national management and coordination. The Centro Task Force proposes that a key role will be to examine current policies to consider conservation vs preservation approaches, and to generate a more cohesive habitat policy which is embedded into national Fisheries Policy. Such a policy must balance the prescriptiveness needed to ensure consistency among some methods with the flexibility needed to allow each jurisdiction to meet its discrete management and legislative requirements. Priority activities of the Task Force will include:

- A review of the Commonwealth Fisheries Management Act.
- A review of NSW, VIC, and TAS Fisheries Management Acts
- A review of Harvest Strategies considering reform of habitat performance indicators.
- A review of the Sustainable Ocean Plan to identify how Centro activities may support the high-level ocean strategy for Australia.
- A move to Holistic Management across jurisdictions for more collective Reef Health management (and link into Sustainable Ocean Plans).
- A review and coordination of the NSW Marine Estate Management Strategy (MEMS) and associated Marine Integrated Monitoring Program to facilitate consistent approaches among Commonwealth and states regarding threats to social, economic, cultural, and environmental values.
- A review of the National Fisheries Plan.
- Consideration for development of new Marine Habitat Management plan.

Photo: Matt Testoni

Indicative Budget

The following funds are sought to implement the Plan over a five year period:

ACTION AREA	INVESTMENT DESCRIPTION	TOTAL 5 YEAR INVESTMENT
Action Area 1: Reef Monitoring and Modelling	$6M for Ecosystem Monitoring and Modelling which includes baseline surveys, density target development and marine spatial data monitoring.	$6M
Action Area 2: In-Water Centro Control and Rehabilitation Strategies	$30M for in In-water control to support the development of targeted and spatially optimal harvest strategies, commercial and Aboriginal fishery development / removal programs, recreational stewardship, etc. Also support for select rehabilitation and stock rebuilding strategies. *** Note the breakdown equates to $10M per state (NSW, Tas, Vic) over 5 years. Average spend of $2M per year. This will be leveraged by State and private investment.*	$30M
Action Area 3: Commercial Industry Support	$8M to drive innovation in processing, market development, business support.	$8M
Action Area 4: First Nations Support	$2.5M to support the establishment of Sea Country Restoration projects. Note leverage to Action Area 1 to support baseline surveys and monitoring and Action Area 2 to support harvest strategies and restoration.	$2.5M
Research and Development	$4M to drive key research priorities, planning, deep water and monitoring.	$4M
Community Engagement & Communication	$2M for implementing communication and stakeholder engagement, marketing and trade development	$2M
National Management, Planning and Policy	$2.5M for Secretariat, Task Force and Advisory Committee coordination and management of National Plan activities	$2.5M
		$55 million

Outcomes

The primary outcomes of this Plan are:

- ***Reduced urchin barrens leading to thriving reef ecosystems:***
- ***Improved reef health, marine ecosystems and Sea Country which is valued and utilised by community.***
- ***Aboriginal people involved with management of sea country and benefit from urchin control.***

The secondary outcome is:

- ***Successful and supported fisheries, with national and international markets.***

OTHER OUTCOMES OF THE PLAN WILL INCLUDE:

1. **Centro Population Management:** Management of Centro numbers to a predetermined balance point in the ecosystem and maintaining numbers within that range.
2. **Structured Fishing Effort:** A coordinated and targeted approach to fishing effort in different areas, with defined outcomes tailored to each region.
3. **Improved climate resilience:** Building resilience to climate induced range shifting species on the Great Southern Reef, providing a management model for other ecosystems.
4. **Ecosystem Rehabilitation:** Rehabilitate ecosystems by repopulating them with kelp and native species, particularly predators of sea urchins, leading to improved marine ecosystem health and resilience in Tasmania, Victoria, and NSW.
5. **Productive Utilization of Urchin Waste:** Maximized the productive utilization of urchin waste, turning it into a valuable resource.
6. **Balancing Harvesting and Economic Opportunities:** Balance harvesting and economic opportunities with effective management and conservation goals.
7. **Local Capacity Building:** This Plan provides numerous pathways for training and workforce development in regional communities.
8. **Sea Country Protection:** Recognize and protect the importance of Sea Country, and incorporation of Traditional knowledge into conservation plans.
9. **Community Engagement:** Community engaged in the management process, gaining societal acceptance and support for active reef management.
10. **Consistency Across States:** Establish agreed methods and approaches across states for harmonized and effective range-wide Centro management.

Conclusion

The management of the longspined sea urchin (*Centrostephanus rodgersii*) range extension has become a pressing concern due to the grazing pressure of urchins causing the formation of reef barrens. Continued range extension poses significant threats to marine ecosystems and biodiversity, as well as the livelihood and wellbeing of the industries and the cultural and coastal communities that rely on the Great Southern Reefs healthy marine environments.

Investing $55 million to manage *Centrostephanus rodgersii,* through the Actions and Pillars presented in this Plan, represents a strategic opportunity to safeguard marine habitats, support sustainable economic growth, honour cultural communities' traditional values, and create a harmonized policy approach across states.

It is essential that this funding consider the unique needs of Centro control and management in Tasmania, Victoria and New South Wales, engaging and incentivising the various sectors and rights-holders. The Centro Task Force wish to acknowledge from the outset that the starting point, values and requirements for each region differ, and the approaches developed and employed through this program need to be flexible enough to accommodate these differences. Although Centro control practices and targets will vary from State to State – and indeed may vary between areas within a State – the overall approach will be unified and strategic under one business framework to maximise the return on this investment.

By integrating research, monitoring, sustainable harvesting, and community engagement in a national management approach, we will collectively achieve a thriving marine ecosystem, and ensure the preservation of natural and cultural heritage, and economic value, for generations to come.

In summary, this Plan provides a roadmap of Actions to achieve effective management of longspined sea urchins impacts on the Great Southern Reef marine habitat. The actions will work to ensure balanced ecosystems. After many years of discussing the need to implement Centro control on a regional scale, the three involved States, Federal agencies, industry, Aboriginal research and community organisations have now come together to co-design a five year Business Plan that will deliver that control via a multi-faceted program.

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