

Senate Standing Committees on Environment and Communications  
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Dear Senate Standing Committees on Environment and Communications

This letter details my concerns re: the *Senate Inquiry on Climate-Related Marine Invasive Species*. Specifically, the range extension of *Centrostephanus rodgersii* (*C. rodgersii*) under climate change into Tasmanian (TAS) macroalgae habitats, where it is invasive.

As a marine biologist (The University of Sydney) and as a surfer/diver I am grateful to be able to comment on this important marine environmental issue.

I wish to highlight the below concerns:

- (1) *C. rodgersii* is native to NSW and urchin barrens are part of an ecologically important mosaic environment of the marine benthos.

In NSW, *C. rodgersii* are abundant in brown algal habitats. Here, their grazing pressure promotes a patchy benthic habitat with areas of bare/crustose algae covered substrate (algal barrens) amongst foliose algae canopies [1]. While barrens have lower benthic invertebrate biodiversity to macroalgae habitats [2] these mosaics promote barren and algal specialist species and provide nursery habitat for fish [3,4]. The long-term existence of barren/algal habitat mosaics today, in NSW, represents a continuation of a stable environment in this region [5].

However, a distinction needs to be made between the NSW and TAS regions of the Great Southern Reef. The recent occurrence of *C. rodgersii* in the cold-water macroalgal habitats in TAS has caused a loss of biodiversity in the resulting urchin barrens [6]. It therefore is important to understand the impacts of *C. rodgersii* to marine ecosystems in its native (Australian mainland) versus its non-native environment (TAS). The situation in NSW where the barrens are stable is very different to TAS and therefore it is not appropriate to broadly apply the events unfolding in TAS to the benthic ecology in NSW.

- (2) Mediating climate change effects should be prioritised for macroalgal habitat management.

Consideration of a climate change risk assessment (temperature, flooding/freshwater runoff, and intensified storms) should be of priority. Holding the recent marine heatwaves and flooding events on the east Australian coast forefront in our mind, extreme weather is becoming more common. Davis et al [7] showed the 2021 flooding events in NSW caused widespread kelp mortality (*Eklonia radiata*), and Mabin et al [8] showed increased temperatures are responsible for widespread *Macrocystis pyrifera* mortality, a kelp species foraged by *C. rodgersii* in TAS. Mitigating climate change effects on macroalgae habitats is likely a more valuable allocation of management resource as expensive kelp restoration efforts can be wiped out by a singular weather event.

- (3) Fisheries; promoting urchin predators and direct removal of urchins.

The establishment of strategic no take zones to promote *C. rodgersii* predator species would manage urchin numbers in invasive regions and fortify coastal ecological processes (including fisheries stocks) under a changing climate [9]. *C. rodgersii* has potential as a fishery to aid kelp recovery – however it is crucial this is well-managed [1]. The ecological consequences of a mass Diadematid urchin loss (as is *C. rodgersii*) can be catastrophic, as we saw in the 1980's with the collapse of some Caribbean reefs after a mass *Diadema antillarum* mortality event (Hughes 1994).

On a personal level I've had the pleasure to enjoy urchin baren/kelp environments for years during snorkels and dives off my home Sydney beaches near Narrabeen and Long Reef.

For these reasons I hope the management policies of these habitats are considered with sufficient diligence and the outcomes are balanced appropriately to suit all this may concern (especially indigenous leaders of relevant sea country).

Yours Sincerely,

Matthew J. Clements

## References

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