Updated: May 2023

Nutritional quality of kelp as a key driver of commercial abalone productivity

Lead Agency: Institute for Marine and Antarctic Studies (IMAS)

Funding: $186,712

Start Date: 1 September 2021 End Date: 31 August 2024

Status: CURRENT

Aims and Objectives:

The principal aim of this project is to classify the productivity of east coast abalone blocks using key nutritional components of understory algae as a proxy for potential productivity.

To determine the role of nutritional status of kelp in the annual seasonal (summer) decline in condition and resilience of abalone to post-harvest stresses and examine the seasonal changes of understory algae nutrition at specific locations where nutrient input is increased and/or displays a non-natural patter of arrival.

Final Report: Executive summary[1]

The primary aim of this project was to identify whether there were distinct regional patterns in nutritional quality of understory seaweeds that correlate with *Haliotis rubra* productivity. The project achieved this aim and identified that the southern and south-eastern regions are characterised by a higher biomass of palatable red seaweeds and a higher availability of protein and essential fatty acids. Moreover, the project identified seasonal patterns in the proportion of essential fatty acids available per gram of seaweed, with reductions in availability during warmer seasons. This seasonal decline in food quality may contribute to the decline in *H. rubra* condition observed during summer. The findings presented here suggest that the seaweed communities in the southern and south-eastern regions likely support higher rates of productivity in *H. rubra*. This

[1] Since the submission of the Final Report, the Project has been reopened to resume sampling of abalone and kelp before, during and after the predicted marine heat wave.

may in turn allow reefs in these regions to support greater harvest levels than their northern counterparts.

The secondary aim of this study was to identify how temperature and inorganic nutrient concentrations influenced the performance and nutritional quality of key seaweeds in *H. rubra* habitat. The project identified that protein and essential fatty acid contents of seaweeds are likely to decline under elevated temperatures. Furthermore, the project highlighted the susceptibility of two key seaweed species in *H. rubra* habitat to elevated temperatures (*Phyllospora comosa* and *Lessonia corrugata*). These findings suggest that under ocean warming and marine heatwave events, the quality of *H. rubra*'s food source is likely to decline, and we may see reductions in biomass of these key habitat-forming species. Together these changes may exacerbate the direct effects of elevated temperatures on *H. rubra*.

These data contribute to the ongoing management of *H. rubra* populations by providing critical knowledge on how the nutritional quality of *H. rubra*'s food source varies on regional and seasonal scales. Moreover, the data provide a preliminary forecast of how food quality available to *H. rubra* may change under elevated temperatures. Combined these findings

can assist management in making informed decisions around regional scale catch limits by

filling a valuable knowledge gap that is required to determine the carrying capacity of *H.*

rubra on Tasmanian reefs in a changing ocean.

Final Report