Abalone Industry Reinvestment Fund (AIRF)

Mapping abalone habitat impacted by *Centrostephanus* on the east coast of Tasmania

Lead Agency: Institute of Marine and Antarctic Studies (IMAS)
Funding: $111,738
Start Date: 1 November 2020 End Date: 31 December 2021
Status: COMPLETED

Aims and Objectives:

The principle aim of this project is to map the fine-scale spatial distribution of key abalone and urchin reef habitats in < 25 m water depth using multibeam acoustic imagery. Detailed substrate type (boulder, flat rock, cobble) and kelp coverage maps will be produced with a focus on key abalone blocks and Centrostephanus impacted areas. Large urchin barrens will be mapped, and the level as to which small incipient barrens can be detected will be quantified. The initial focus on key abalone and Centrostephanus areas will facilitate strategic decision making for urchin control and abalone management.

Barrens are the physical representation of impact and again, understanding their distribution and dynamics is fundamental to strategic decision making. Prior to the formation of barrens, kelp forests show marked changes in the density and the size of individual plants. Being able to detect incipient barrens as early as possible would allow for timely interventions.
The project has the following key objectives:

1. To map the overlapping abalone and urchin habitat and substrate complexity via new water column acoustic methods.
2. Establish a 2020 baseline of kelp abundance at depths where urchin impact on blacklip abalone habitat is greatest (10 - 20m).
3. Determine acoustic threshold limits where incipient barrens can be detected.
4. Identify areas of urchin barren, and areas susceptible to extensive barren formation
5. Determine the suitability and cost effectiveness of acoustic sonar water column methods for state wide reef monitoring.

Final Report:

The principle aim of this project was to map the fine-scale spatial distribution of key abalone habitat overlapping with urchin impacted reef in < 20 m water depth using multibeam acoustic imagery. Detailed substrate type (pavement reef, mega clast reef and mixed consolidated sediment/ reef and sand) and kelp coverage maps have been produced for the east coast of Tasmania in *Centrostephanus* impacted areas. Large urchin barrens have been identified and the minimum quantifiable unit of which small incipient barrens can be detected is identified.

This data will assist in the facilitation of strategic decision making for urchin control and abalone management. All spatial datasets have been uploaded onto the Seamap Australia data portal as a resource for both managers and scientists for further analysis and study. This data provides a snapshot of the 2021 distribution of seafloor habitats and associated vegetation distribution. Barrens are the physical representation of *Centrostephanus* impact and understanding their distribution across reef type is fundamental for strategic decision making to address this increasing problem. Prior to the formation of extensive barrens, kelp forests show marked changes in the density and the size of individual kelp thalli as small metre-scale incipient barrens coalesce to form larger features on the seafloor. Being able to detect the development of incipient barrens as soon as possible enables timely interventions prior to broad-scale kelp bed collapse.

The project has met the following key objectives:

1. Maps show the coincident reef structure with an overlay of the probability of urchin barrens. These data are presented as a 'traffic light report' (with areas of barren, partial vegetation and full cover vegetation mapped) and as a continuous dB surface at 9 m2 scale of vegetation cover.
2. Established the 2020 baseline of kelp abundance at depths where urchin impact on blacklip abalone habitat is greatest (10 – 20 m).
3. Determined the acoustic threshold limits and scale at which incipient barrens can be detected using acoustic methods and a recommendation of these methods for future monitoring.
4. Determined the suitability and cost effectiveness of acoustic sonar water column methods for state-wide reef monitoring.

Multibeam sonars have become a commonly used technology for mapping and classifying benthic habitats. More recently advances in multibeam technology have led to systems that can continuously log water column intensity data as well as the seafloor signal. This new source of information has been investigated in this project as a method to map the vertical dimension of the water column to classify reef systems that support abundant kelp communities and those that do not. Currently there is a limited documentation on these techniques in the literature and this report provides an assessment of the accuracy of these methods for monitoring reefs and the associated benthic community structures.