Australian Government | Australian Institute of Marine Science

NORTH WEST SHOALS TO SHORE RESEARCH PROGRAM

June 2019




Informing the sustainable development of Australia's North West marine estate

Welcome to the quarterly newsletter from the North West Shoals to Shore Research Program (NWSSRP). Produced by the Australian Institute of Marine Science, this bulletin will provide updates on activities within the three-year program.

In this edition:

What's happening?

Ancient Coastline Surprise

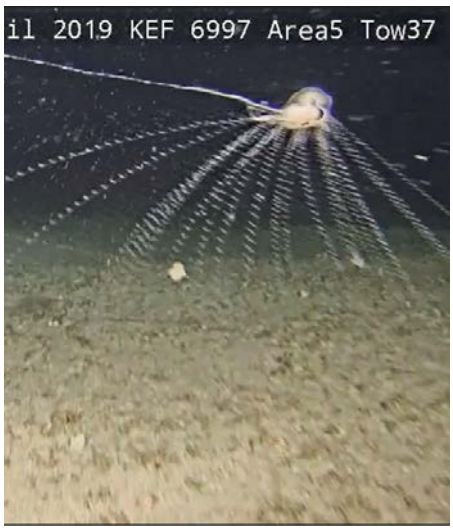
Seabed habitats and biodiversity

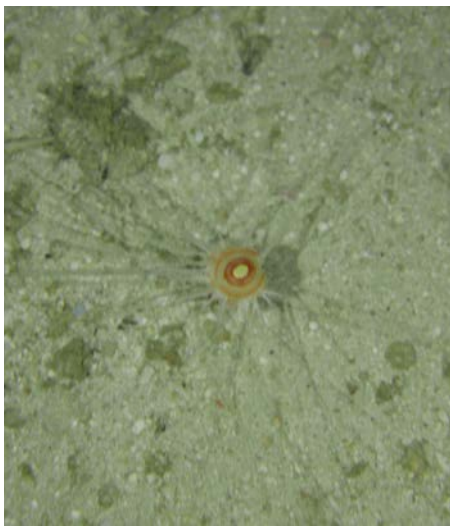
A recent voyage on RV Solander to survey the Ancient Coastline Key Ecological Feature brought quite a few surprises. Most interesting was the discovery of fields of benthic siphonophores, something no one onboard had seen before. Siphonophores are cnidarians (related to corals and jellyfish) and are usually in the water column.

Benthic siphonophores are unique because they anchor themselves to the seafloor with their tentacles, while their bodies float above the surface – often described as looking like a tethered balloon! They are generally found in deep water (100-3000m). Our observation in ~100-150m is therefore at the shallow end of their range.

The project is increasing our knowledge of the benthic biodiversity and the habitats along the ancient coastline of the North West Shelf at the 125 metres depth contour.

Below: Tow video revealed fields of benthic siphonopores along the Key Ecological Feature at 125 metres.






SNAPSHOT

Marine noise and monitoring

The Australian Institute of Marine Science has conducted the first real-world seismic experiment to determine the effects on fish and pearl oysters.

The experiment, using the seismic vessel the BGP Explorer, surveyed two sites off the northwest of Western Australia over ten days in September 2018. The experiment, which has taken the collaborative efforts of more than 100 people 12 months to design and coordinate, could help to clarify some issues around the impacts of marine noise.

Above: BGP Explorer towing the air gun array for the North West Shoals to Shore Marine Noise experiment.

Measurement and modelling

The measurement and modelling of received noise levels and particle motion was led by Curtin University and included:

- 20 passive acoustic monitoring moorings deployed across the pearl oyster exposure site, during the experiment.
- 18 passive acoustic monitoring moorings were deployed across the fish study site, during the experiment.

Above: Deploying acoustic receivers on BRUVS from the AIMS vessel RV Solander.

Data Collected

The full suite of deployments has been subject to QA/QC checks and lodged with AIMS data management. The culmination of these has been:

- 116 individual sensor deployments that overlap seismic vessel transects.
- 150 datasets of passes from the seismic vessel (including active and inactive air-gun operations) across the two sites (measuring pressure, particle velocity and ground motion).
- More than 200,000 recordings of air-gun shots, at least half of which were at a discernible signal-to-noise level.

Above: Red emperor were captured and tagged with acoustic transponders before being released.

Fish Experiment Site Activity

At the fish experiment site we monitored on three occasions prior to, and on two occasions after passage of the seismic vessel using:

- BRUVS to quantify relative abundance and diversity of demersal fishes.
- Acoustic receiver arrays with a total of 76 receivers. These were deployed in a hexagonal grid covering an area of ≈5 km diameter at the high exposure and the vessel control sites. A further 22 acoustic receivers were deployed in a ring around outer boundary of the array at the high exposure site. A total of 390 red emperor were captured and tagged with acoustic transponders, before being released into the receiver array.
- Echosounder transects to count individual fish ‘targets’ at various heights in the water column.
- Sediment grabs for collection of infauna communities.

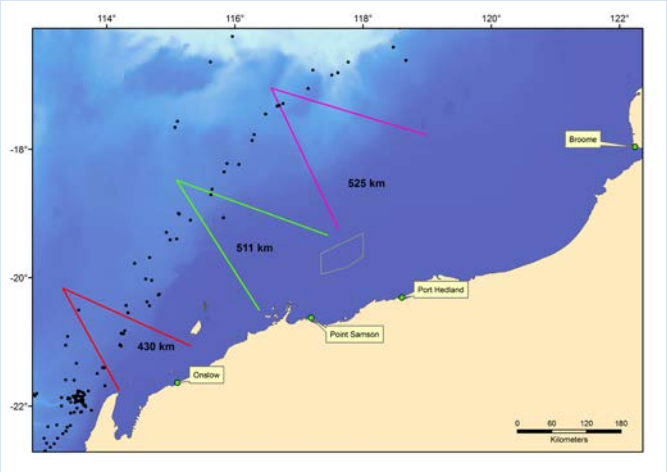
Above: Samples were taken from red emperor before being released.

Passive Acoustic Surveys: Ocean Gliders

Protected and iconic species movement, distribution and threats

Late April saw the first deployment (pink survey path in the map right) of the Integrated Marine Observing System (IMOS) gliders fitted with sound recorders to listen for pygmy blue whales as part of the NWSSRP threatened species project in collaboration with Curtin University's Centre for Marine Science and Technology (CMST).

Usually the gliders dive up and down collecting data on a range of oceanographic parameters and come to the surface regularly to transfer and receive data via satellite. The NWSSRP glider, however, has been fitted with two sound recorders so now as the glider does its regular work it is also recording the sounds of the pygmy blue whales (and likely other whales too).



Above: Survey paths for the three Slocum sea gliders fitted with sound recorders.

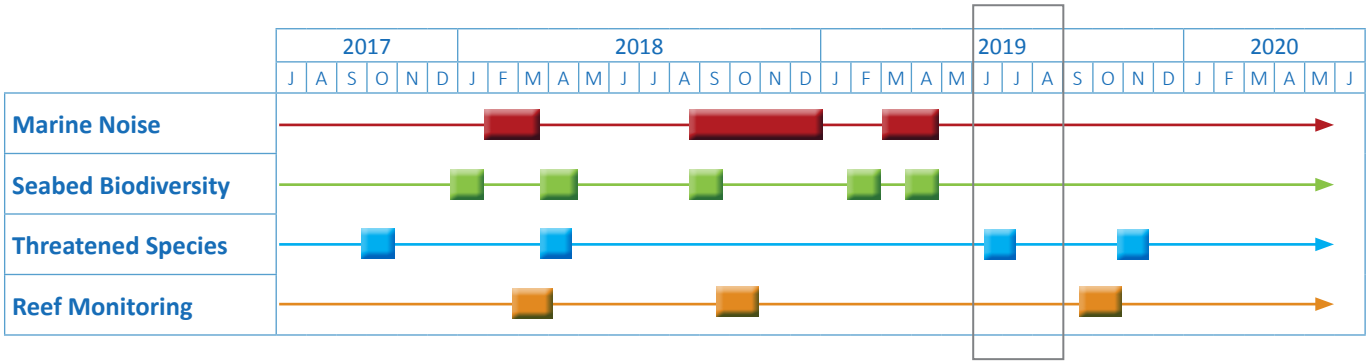
Two gliders fitted with noise recorders have successfully been deployed and recovered. A third glider was deployed 17th June. The recorded sounds will provide an indication of the presence of whales and a proxy of whale density.

These data will be used along with historic noise logger data from CMST and satellite tag deployments to learn more about their distribution.

The objectives of this project are to quantify the movement, the distribution and the threats to pygmy blue whales on the North West Shelf, and to find the biologically important hotspots such as foraging areas.

Left: glider deployed near Rowley Shoals recovered after ~ 1 month out on the Shelf sampling the water column and carrying a sound logger (orange) to record whale calls.

On the horizon



Projects conducting fieldwork in the next three months:

June / July 2019

Theme: Threatened Species

Attach satellite trackers to pygmy blue whales at Ningaloo during their northward bound migration.

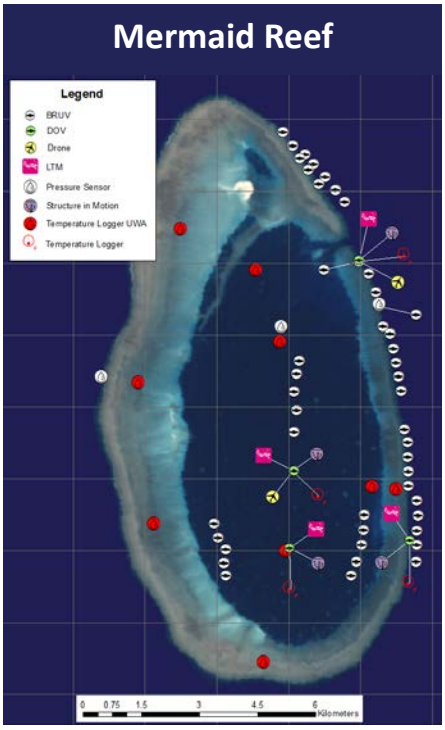
October 2019

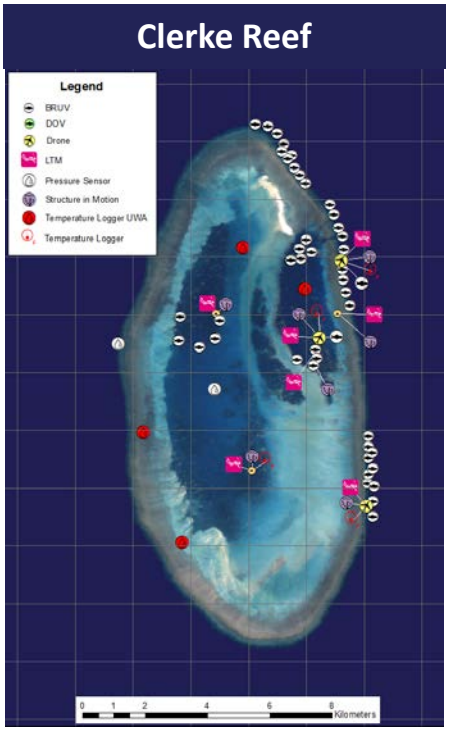
Theme: Seabed habitats and biodiversity

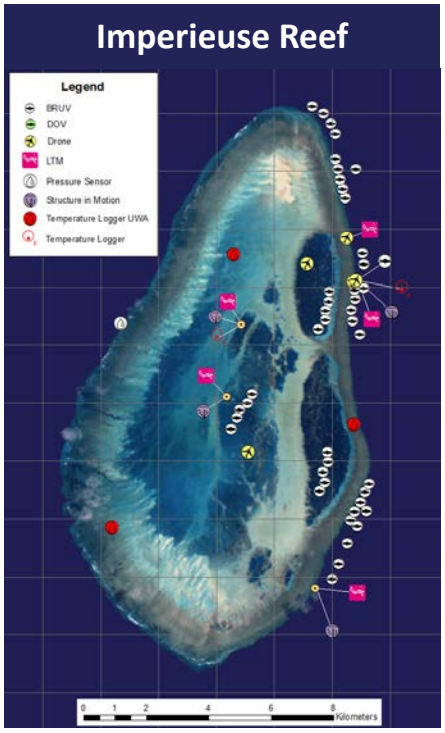
Collect physical oceanographic data and predatory fish and shark data at Rowley Shoals.

Work completed at Mermaid Reef, Clerke Reef and Imperieuse Reef

Spatial Dynamics of Isolated Coral Reef Atolls







This project is reviewing and leveraging AIMS' historical research and monitoring programs at the Rowley Shoals oceanic reefs to develop a standardised approach to mapping and monitoring, which integrates emerging technologies, and focuses on what drives environmental change.

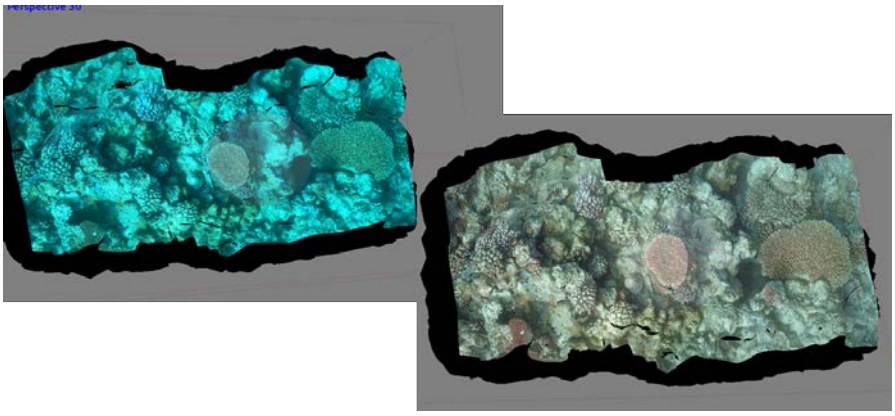
Stereo-BRUVS were deployed at 135 sites and stereo-video (DOV) surveys of fishes were conducted at four Mermaid Reef sites. At the 30 long-term monitoring sites surveyed across the three reefs, drones were flown over 13 sites and structure in motion surveys conducted for 3D reconstructions of coral communities.

Temperature loggers were also deployed at most of the long-term monitoring sites, in addition to 20 temperature, pressure and/or current sensors retrieved and deployed for an oceanographic model addressing fine-scale connectivity and heat exposure.

Over 10 km^2 of existing long-term monitoring transects were surveyed using traditional and new methods.

The data have been processed to generate 3D reconstructions of coral communities, (below). These provide a video mosaic that can be used to compare and contrast with other areas and better understand the interactions among benthic organisms.

These very fine-scale measurements are meshed with larger-scale measurements of community change and habitat distribution using images obtained from tow video, drones and satellites.



Above: Maps showing work completed. Right: Example showing image mosaics reconstruction before (top) and after (bottom) 'generative adversarial networks' image correction.

For more information on the full program, head to www.aims.gov.au/nw-shoals-to-shore

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Santos

Helping to better understand WA's marine environment.