

NORTH WEST SHOALS TO SHORE RESEARCH PROGRAM

December 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 (AIMS).

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SAVE THE DATE
NWSSRP SYMPOSIUM
22 MAY 2020
PERTH, WA

What's happening?

First Pygmy Blue Whale Tagged Off North West Cape

Early results are out on the movement behaviour of the first pygmy blue whale ever to be satellite tagged off North West Cape near Exmouth.

The whale, named "Liberty" or "Libby" for short, was tagged with a Fastloc GPS Limpet tag. These tags are designed to be non-invasive, lasting for 1- 2 weeks on average before coming free. Libby's tag lasted for 17 days.

The raw location data received from the tag via the Argos satellite network was analysed with a state-space switching model.

The model produces a most probable track (taking into consideration the location error) and uses simple metrics, such as speed and turning angle of the tracked whale, to identify the behaviour underlying the track; resident and transient movement.



Pygmy blue whale "Libby" was tagged near Exmouth (Photo: Ningaloo Aviation)

Pygmy Blue Whale Tracks Along the North West Shelf

Threatened Species

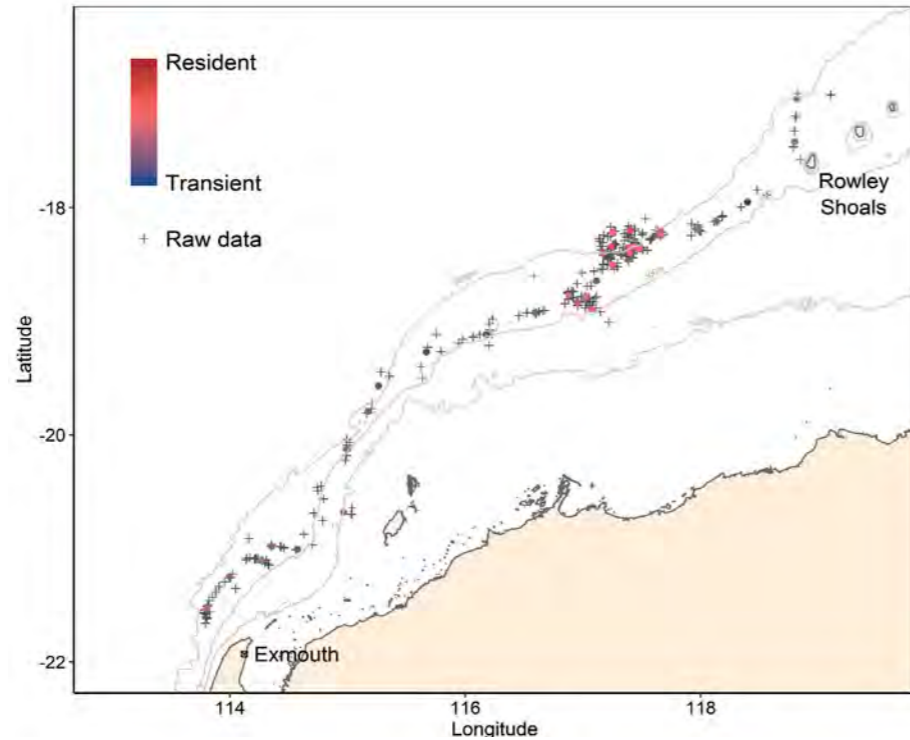
Residency is often associated with searching for food or other resources, when an animal will make more and sharper changes in direction, and move more slowly than an animal transiting, which will move in a more directed and rapid way. Residency can also be associated with resting. The map shows the raw location data from the satellite tag (grey plus symbols) overlaid with the most probable track (filled points) colour coded for behaviour.

After a short period of residency (~1 day) after tagging off North West Cape, Libby headed northeast with a period of residency (~2 days) around 117 E, -18.7° N and another of 4-5 days around 117.5°E, -18.4°N.

Libby then switched to more of a transitory movement and continued in a northeasterly direction to the Rowley Shoals when the transmission stopped.

Libby's track covered 950 km with an average rate of travel of 2.5 km ± 1.4 km/hr, largely at the shelf edge.

The tag also collected summary information on the diving behaviour. The pygmy blue whale's diving depth was up to 250 metres but with most diving at around 0-10 metres and 50-100 metres with the duration of



Above: Map showing the track of the pygmy blue whale with raw data in grey overlaid with state-space model position estimates (2 per day) colour coded by behaviour (resident or transient).

the dives mostly 2-12 minutes long and 4 per cent of dives longer than 24 minutes.

The research team were excited to have another pygmy blue whale tagged and providing information on how they use the North West Shelf habitat, an area that has so far only had three other tagged whales (tagged at Perth Canyon and Great Australian Bight) pass through it.

Although more pygmy blue whales were planned to be tracked as a result of the June 2019 field trip, poor weather and difficult conditions prevented more tags from being deployed.

Another tagging trip is planned for May/June 2020.

Testing eDNA Potential

Water samples were collected from the Perth Canyon and at North West Cape in May 2018 to be analysed for pygmy blue whale DNA.

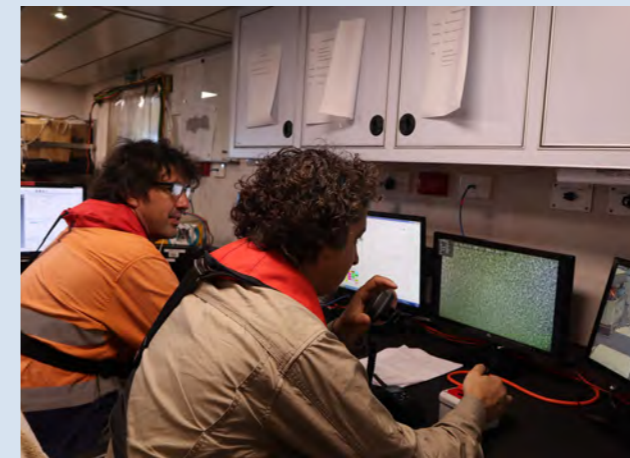
The water samples were filtered and sent to the AIMS office in Darwin where preliminary genetic analysis have identified whale DNA in some samples.

Based on these results, further water sampling was carried out in 2019 from

around the North West Shelf during the northern migration (April- June).

The objective of this work is to assess the viability of using eDNA to indicate presence of pygmy blue whales.

Presence data obtained from eDNA analyses could potentially contribute to the development of distribution maps for the species.



Above: Baited Remote Underwater Video Systems (BRUVS) were deployed from the RV Solander.



Above: Red Emperor are among the fish communities characteristic of the region.

Ancient Coastline Mapping

Seabed Habitats and Biodiversity

November saw the final leg of the Seabed Habitats and Biodiversity project to map the Ancient Coastline Key Ecological Feature (AC KEF).

Capitalising on the good weather and sea conditions, the research team successfully deployed towed video and Baited Remote Underwater Video Systems (BRUVS) in water depths ranging from 110 to 170 metres. Extensive multibeam data was also collected from the RV Solander.

The areas were characterised by relatively flat, sandy sea bottom and an extensive pockmarked field with 'holes' in the sediment at times 10 metres wide and few metres deep.

The fish communities were characteristic of the region and were dominated by various shark species including hammerhead and tiger sharks.

The final datasets complement data on benthic habitat, fish biodiversity and bathymetry of the AC KEF collected during four previous voyages. Collectively they will help to describe the distribution and abundance of marine biota along the Ancient Coastline to start to better understand the ecological significance of the feature.

The researchers also aim to produce continuous predictive maps of benthic habitat and fish community distributions across the five areas surveyed along the AC KEF spanning more than 600 kilometres.

Trial Run for AIMS Mobile Aquaria

Spatial Dynamics of Isolated Coral Reef Atolls

The final field trip for the Isolated Coral Atolls project was conducted in October. All planned work was completed successfully, from 37 sites across the Rowley Shoals. This included surveys of coral and fish communities, deployment and retrieval of oceanographic instruments and coral heat-stress experiments in a mobile aquaria system.

The mobile aquaria system, or mini SeaSim, was designed with the AIMS Townsville Sea Simulator (SeaSim) staff, who built and installed the system on the RV Solander prior to the trip.

The resulting data will be analysed and incorporated into the wider project objectives. Once complete (mid 2020), the project will provide insights into the baseline dynamics of a healthy system of reefs, test novel methods for mapping and monitoring the condition of reefs, and explore the resilience and adaptation of corals through the climate crisis.



Above: The AIMS SeaSim mobile aquaria

Does Colour Affect Fish Surveys?

Seabed Habitats and Biodiversity

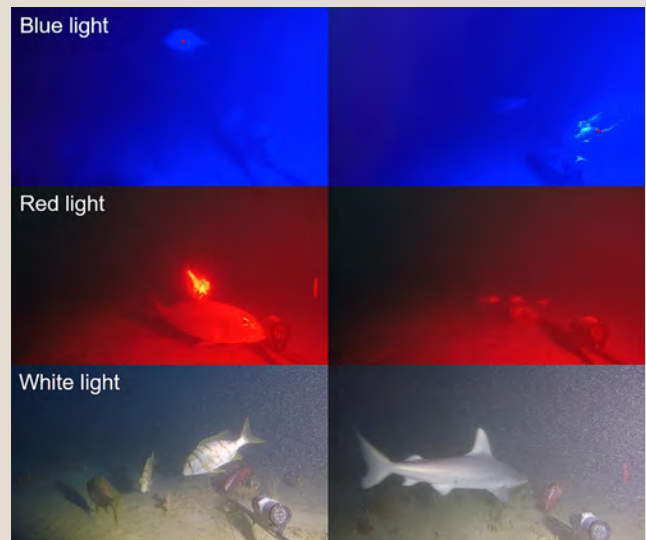
Researchers working to capture fish activity using underwater video at ~130 metres on the North West Shelf have tested whether the choice of lighting colour may affect survey result.

The mesophotic, or ‘middle light’, zone is between the brightly lit shallow waters and the deepest, darkest depths of the ocean. Baited remote underwater video systems (BRUVS) are a well-established sampling tool for quantifying fish communities at these depths. In the lower mesophotic zone, lights are required to illuminate the sample area and allow for fish identification, yet the effects light colour may have on fish has not previously been tested in this zone.

The results of the study: *Comparing the effects of different coloured artificial illumination on diurnal fish assemblages in the lower mesophotic zone*, published in the journal *Marine Biology*, tested red, white and blue light with a GoPro action camera.

Lead author Matt Birt from the Australian Institute of Marine Science described the results as a trade-off between a greater mean number of fish observed and a better quality image.

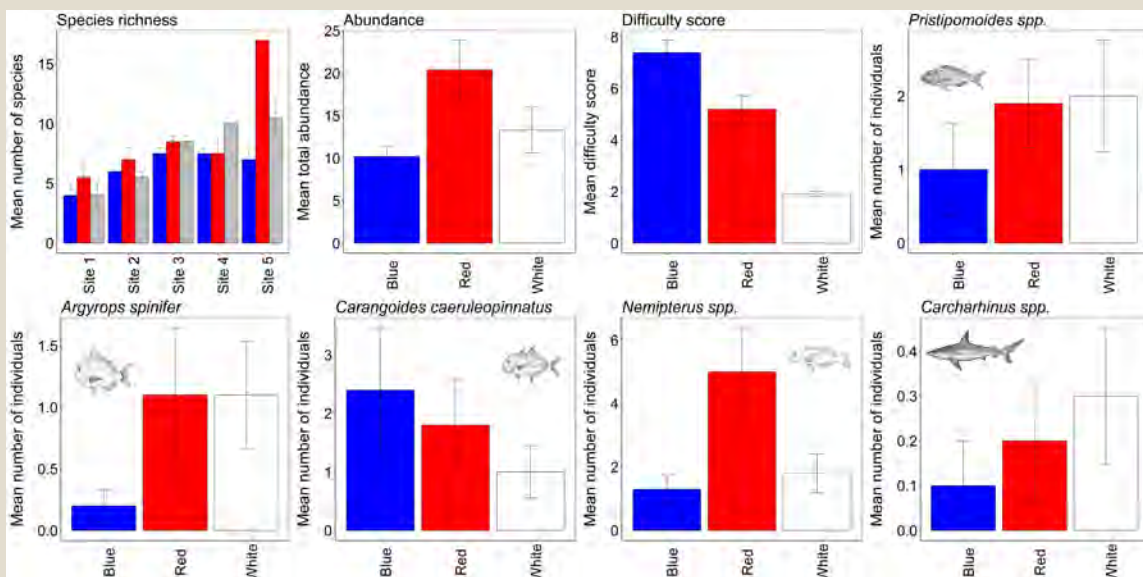
“We compared the number of fish sampled under Royal blue (~ 450 nm), Deep red (~ 660 nm) and natural day white light (~ 5600 K),” Matt said. “We didn’t detect any



Above: Example images demonstrating the visual quality of imagery under blue, red and white illumination. (Birt et al. 2019)

significant difference in the composition of the assemblage or the number of species however, we were able to observe a higher average number of fish using the red light. Under white light the picture is much clearer and therefore it’s easier to identify the fish.”

The study concludes that the best way to sample diurnal mesophotic fish assemblages is to use a wavelength of light based on the survey objectives and the capabilities of the camera selected.



Above: Mean number of species, mean total abundance, difficulty score and number of individuals under blue, red and white illumination (Error bars = ±SE).(Birt et al. 2019)

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

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