



## Project 4.8.7 Forecasting risk of exposure to Irukandji

April 2008 Milestone Report

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### Summary

Projected milestones were as follows (from Schedule):

- (a) Collect samples for the project during the stinger season from November to May.
- (b) Expand a microsatellite DNA marker library to assess spatial structure in *C. barnesi* Use elemental chemistry and microsatellites to test for differences in the population structure of *C. barnesi* and *C. fleckeri* among locations.
- (c) Develop a risk maps for stingers including time of year, geographic variation, species distribution etc. from existing data sets and expert opinion (contingent on funding).
- (d) Develop set of response guidelines to reduce risk to human health (contingent on funding).

### Project Results

#### (a) Collection of samples

The first broad-scale survey of cubozoans was done in the summer of 2007 to 2008. Three cross shelf cruises (transects) were done between December 2007 and February 2008. Transects were Lizard Island, Cairns and the Palm Island Group. Cubozoans were sampled by light attraction (1000 W bulbs) at three distance strata (Inner, mid and outer). Within each distance strata sampling was done at two sites separated by 0.7 to 3 km and at each site two replicate one hour samples were taken for abundance data and the lights were left on for longer for the purposes of collecting jellyfishes for genetics, elemental chemistry and a piggy back projects. Fine-mesh plankton samples (100  $\mu\text{m}$  mesh) were taken at all sites to detect small jellyfishes and describe cross-shelf patterns of plankton abundance. All of the plankton samples have been worked up.

We collected 96 *Carukia barnesi* in all three cruises.

Sampling was also done by beam trawl (3 m \* 0.5 m, 1mm mesh) at all cross shelf transects. The beam trawl was towed in very shallow water (< 2 m deep) and deeper waters (3 to 5 m deep) adjacent to the mainland at the entrance of rivers and 1 km from the rivers; n= 2 ten minute tows.

We consider the data to be publishable in a refereed journal once we have repeated the sampling design in 2008 to 2009.

Sampling of opportunity has been done at Weipa (QLD), Darwin (NT); Broome (WA), Double Island (QLD, and Mission Beach (QLD) these samples have been used for studies on genetics and elemental chemistry.

### **(b1) Microsatellite DNA marker library**

We have successfully identified microsatellites for *Carukia barnesi* and *Chironex fleckeri*. The results of the of the *C. barnesi* library are being prepared for a Primer Note. With a library for both species we can now apply the microsatellite technique to population studies. More samples are required in 2008 to 2009 before genetics population study is publishable.

### **(b2) Elemental Chemistry**

We have successfully detected elements in the calcium sulphate statoliths of *Chironex fleckeri*. Our success with *Carukia barnesi* has been more limited as the statoliths are so small they are often destroyed by the Laser (ire ICP-MS)

Honours project of Chris Mooney- Chris will complete his Honours on stock Identification and the movement of cubozoans in June 2008.

Studies that have piggy backed on the project are as follows:

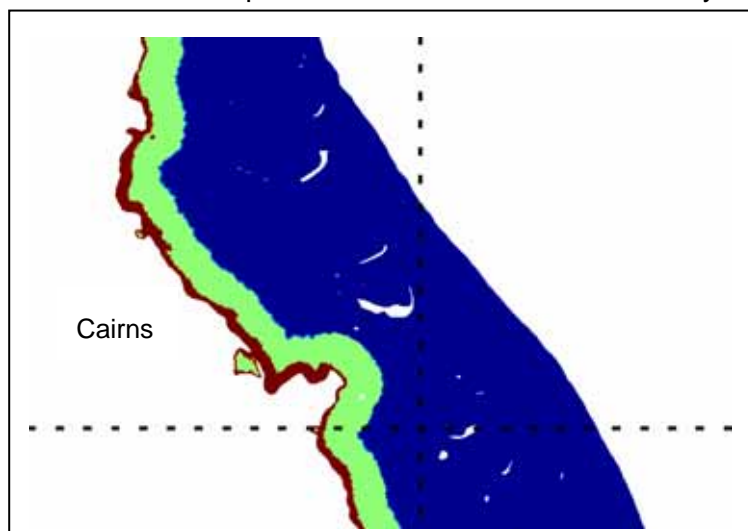
A Minor Project by Chooi Fei Ng (Masters by Course work). A comparison of the statolith shape of cubozoans. Fei has been using statolith shape and Fourier analysis) to distinguish cubozoans of different taxa. Six species have been examined so far and the results show robust differences between taxa.

A Minor Project was done by Jytte Ryan (Masters by Course work) on cross-shelf patterns of zooplankton abundance.

### **(c) Develop risk maps for stingers**

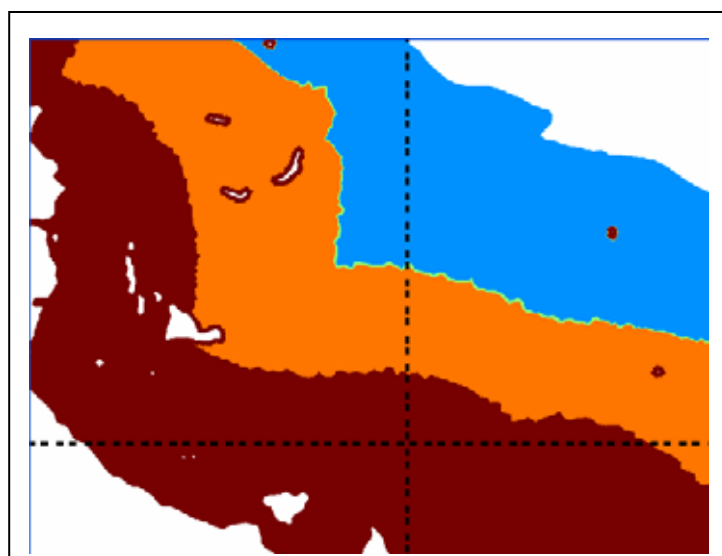
Our funding was limited for this, but we have collaborated with Eric Wolanski to generate risk maps for stingers and *Carukia*. The maps have rudimentary criteria at this stage, but we expect the sophistication of the models to increase as we gain more information over the next few years.

Extracts of the maps below are based on summer only when risk is greatest.



Chironex fleckeri risk map

Maroon – extreme risk  
Green High risk  
Dark blue – very low risk



Carukia barnesi risk map

Maroon – extreme risk  
Orange Very High risk  
Blue – low risk

This map would not have been possible without the cruises that have been completed

**(d) Develop set of response guidelines**

Guidelines will be developed in combination with the development of risk maps as above.

All of the milestones have been delivered.

The project has directly supported one Honours Student (Mooney) and one Masters by course work student (Ryan). In addition, support has gone to one Masters by course work student (Ng) and two PhD students (Mathew Gordon – predicting where and when box jellyfish are found) and Michelle Templeman (Chemistry of jellyfishes – a potential tool for biomonitoring).

## Summary of major cruises for the summer 2007 to 2008

Time	Location	Target Species	Number	Notes
Dec. 2007	Lizard Island transect	<i>Carukia barnesi</i> , <i>Chironex fleckeri</i> and other cubozoans	94	Cruise – inner shelf to outer shelf reefs and beach collections on the mainland
January. 2008	Cairns transect	<i>Carukia barnesi</i> , <i>Chironex fleckeri</i> and other cubozoans	Two	Cruise – inner shelf to outer shelf reefs and beach collections on the mainland
February2008	Palm Island transect	<i>Carukia barnesi</i> , <i>Chironex fleckeri</i> and other cubozoans	Zero	Cruise – inner shelf to outer shelf reefs and beach collections on the mainland