

Darwin Harbour Indigenous Marine Ranger Program Biodiversity Impact Mitigation Offsets Strategy (BIMOS)

Annual Report,
1st November 2014 to 31st October 2015

Overview

Commencing in October 2013, the Darwin harbour indigenous marine ranger program is an innovative monitoring and training program involving close collaboration between the Department of Land Resource Management (DLRM) and Larrakia Nation Aboriginal Corporation (LNAC).

Funding was provided to DLRM to establish and implement the Program as an offset for the Darwin Harbour East Arm Wharf expansion managed by the Department of Lands, Planning & Environment.

The Program has developed into a successful collaboration between the DLRM, Larrakia Nation and other project partners to achieve broader social and environmental benefits through engaging and enhancing indigenous capacity at an individual and organisational level in marine ecosystem monitoring.

Background

The East Arm Wharf expansion works are subject to the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval. In accordance with the requirements of Condition 33 of the EPBC Act Approval Decision 2010/5304 the Darwin Harbour Indigenous Marine Ranger Program was established.

Implementation of the Darwin Harbour Indigenous Marine Ranger Program was as follows:

- Recruit two indigenous marine rangers.
- Train and engage marine rangers in water quality, sediment health and marine biodiversity monitoring with DLRM.
- Train and engage marine rangers in harbour surveillance and reporting.
- Train and engage marine rangers in migratory bird monitoring with project partners Charles Darwin University & North Australian Indigenous Land and Sea Management Alliance (NAILSMA).
- Contribute to and promote monitoring to stakeholders through the Darwin Harbour Region Report Cards.
- Participate in the annual Darwin Harbour Clean-up Day.

Project Update

Rangers were again this year actively participating in harbour monitoring programs, addressing threats to listed threatened species and listed migratory species. Major achievements for this year included the completion of their Certificate II, Conservation & Land Management course and attending the Sea Turtle Health and Rehabilitation Workshop.

Jade Murphy had some time off for the birth of her first child, providing an opportunity for other Larrakia rangers to fill in and become exposed to marine ranger activities whilst the recruitment process was underway. Core marine rangers were Aleana Talbot and Stephen Dawson. Mahala Thompson was welcomed to the marine ranger team this year and Jade will return to the program in December 2015.

Project partners were keen this year to expose rangers to the backend of monitoring and research work. Rangers learnt how to prepare water quality samples for analysis in the microbiology laboratory and became more involved in data entry and interpretation with the Marine Ecosystem Group's, Dolphin and Seagrass programs.

The funding agreement has been further extended through to the 30th September 2016. The rangers look forward to completing their coxswain's final exam and completing their Certificate III in Conservation & Land Management.



Marine rangers Aleana & Stephen with Ruth & Matt from Water Resources, Department of Land Resource Management lowering water quality monitoring equipment into the Harbour.

Training

Approximately 25% of the marine ranger's time has been dedicated to providing opportunities for them to be trained and gain qualifications in the following:

Training Course	Status
Drive Safe Training, Department of Transport	Ongoing
Certificate II in Maritime Operations Coxswain, CDU	Ongoing
Intermediate Excel	Complete
Sea Turtle Health & Rehabilitation Workshop, Cairns	Complete
Certificate II Conservation and Land Management, Batchelor Institute	Complete
Certificate III Conservation and Land Management, Batchelor Institute	Ongoing
Mapping Skills Workshop, NAILSMA	Complete
White Card, CDU	Complete
Making New Tracks Workshop & Strong Spirit Program, Larrakia Nation	Complete

In addition to formal training the marine rangers also gain on the job training provided by DLRM and project partners. The training focused on equipping the marine rangers with the skills and knowledge to be able to actively participate in monitoring and research activities in a safe manner. They included the following:

- Water monitoring techniques (equipment preparation, use and servicing; field techniques; field protocols for recording data, chain of custody requirements; introduction to laboratory chemical analyses and procedures)
- Water flow monitoring, use of equipment, recording data and calculating velocities and flow;
- Seagrass identification, monitoring techniques and data entry
- Dolphin identification, monitoring and data entry
- Migratory bird identification, tracking techniques and I-Tracker
- Microbiology Laboratory skills
- Aquatic pest identification and monitoring techniques
- Marine turtle identification, survey and monitoring techniques
- Dugong monitoring

- Monitoring and surveillance of turtle nesting sites, locations of marine animal remains and unusual marine debris.

On Water Field Activities

It was anticipated that the Darwin Harbour Indigenous marine rangers would spend up to 80% of their time in the field (181 of 230 working days) working towards the following as stated in the offset agreement:

- 39 days/year associated with beach water quality monitoring
- 36 days/year associated with water quality monitoring
- 30 days/year dolphin monitoring
- 20 days/year associated with unscheduled on-water response activities
- 10 days/year associated with unscheduled monitoring and surveillance activities.
- 10 days/year with seagrass monitoring
- 10 days/year fish monitoring
- 10 days/year Marine Wild Watch program
- 10 days/year migratory bird surveys
- 5 days/year with sediment health monitoring
- 1 day/year Darwin Harbour Clean up

Their actual time in the field was approximately 75%, (174 out of 230 working days). Below is a summary of their activities. The remaining days were allocated to training, attending and presenting at conferences, symposiums and conducting community engagement activities.

Field Work Summary Actual	Days/year
Beach water quality monitoring (DLRM monitor once a month during the swimming season approx. 5 days/year).	2
Water microbiological Laboratory	2
Water quality monitoring	43
Dolphin monitoring (DLRM monitored March/April only this year, previous years have included an additional October run)	16
Unscheduled on water response (No incidents of significance occurred)	0
Unscheduled monitoring or surveillance activities	Whenever on water this activity was undertaken - 101
Sub tidal seagrass field survey	27
Seagrass Watch	2
Sediment health monitoring	2
Marine pest & aquatic biosecurity monitoring	11
Aquatic pest eradication (One mile Dam, <i>Gambusia</i> eradication program)	5

Fish Monitoring (Monitoring program ceased end October 2013).	0
Marine Wild Watch Program	5
Migratory birds surveys	11
Darwin Harbour Clean-up day	1
Marine debris, biosecurity and beach cleanup days	5
Turtle survey and monitoring	5
Northern Institute at Charles Darwin University & the Australian Institute of Marine Science - Valuing our Harbour Community Survey	9
Seagrass & Dolphin monitoring data processing	13
Shell Midden Survey	5
Coastal re-vegetation activities, tree point and east point reserve	10



Aleana, Mahala & Selina recording sea turtle nests



Kelly & Luke from Marine Ecosystems Group with Aleana & Jade, tracking migratory shorebirds.



Aleana, Jade and Yolande, Harbour clean up



Mahala & Aleana on the shell midden survey



Rangers Alan & Stephen with Tony from Marine Ecosystems Group monitoring seagrass.



Aleana with some washed up marine debris.

Community Engagement & Awareness

- Marine ranger article in the Darwin Harbour Report Card 2015
- Marine ranger article in Larrakia Nation Annual Report 2014/2015
- Marine ranger article in Charles Darwin University, Research & Collaborative Outcomes 2015 (Attachment 1).
- Participated with AQIS, beach debris survey
- Assisted Dr Tom Brewer, Northern Institute at Charles Darwin University & the Australian Institute of Marine Science with traditional owner surveys, *Valuing our Harbor Community Survey*.
- Rangers attended the National Estuaries Network Symposium, Darwin.
- Presentation about Larrakia Nation & marine ranger program at the Australian Institute of Landscape Architects Conference, Darwin.
- Presentations with DLRM to Kormilda College & Good Shepard School students about the Darwin harbour monitoring program.
- Attended INPEX GHD, DLRM dolphin monitoring presentation
- Finalist NT natural resource management awards & NT Landcare awards 2015
- Rangers attended 2015 NT Natural Resource Management Conference, Darwin.
- Regular Darwin harbour and marine ranger program reports to the Larrakia Board.

Conclusion

2015 has been another busy year for the marine rangers. The implementation of the Darwin harbour indigenous marine ranger program has met the requirements of the biodiversity impact mitigation offsets strategy for the East Arm Wharf expansion project by providing rangers training and field time.

Appendix 1, Charles Darwin University, Research & Collaborative Outcomes 2015



With the support of ConocoPhillips I have commenced my PhD research at CDU to better understand sediment nutrient dynamics and preserve water quality and biodiversity in Darwin Harbour.

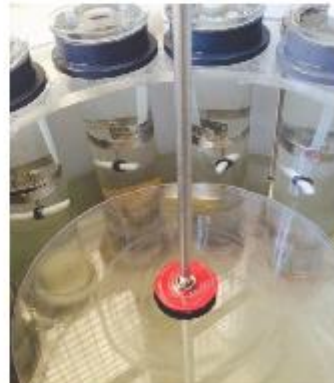
So far I have:

- Completed a pilot study to optimize laboratory methods for measuring nitrogen turnover in sediment core incubations. This is known as nitrogen 'flux' and the incubations are done in 'chambers'.
- Completed a preliminary sediment and water quality analysis.
- Started nutrient chamber studies that integrate flux measurements with measurements of the bacteria responsible for nitrogen flux.
- Purchased a qPCR unit for molecular research to support the project.
- Worked with Larrakia Sea Rangers as part of capacity building and training activities.

Broader Research Outcomes:

This research will provide Government, Industry and the Community with:

- An improved collective understanding of nitrogen cycling in Darwin Harbour
- Increase community confidence that we understand the state of the Harbour's health
- Provide sound evidence for Government, industry and community decision making about the health of the Harbour
- Provide industry with 'Healthy Harbour' early warning monitoring tools e.g. above background changes in nitrogen activity.



Julia Fortune and Matt Majid sampling in Short Creek - a tidal creek of the Elizabeth River. Cores are returned to the lab and placed within an incubation chamber with rotating magnetic stirrers to maintain ambient dissolved oxygen.



Jerry Chion is currently being trained by staff at CDU to use the Rotor-Gene Q and assist with laboratory processing in conjunction with the project.

The Rotor-Gene Q

Quantitative real-time PCR is a precision science that requires specialist instrumentation, chemistry and software. High thermal and optical uniformity, short equilibration times and fast ramping rates are critical for precise and rapid quantitative analysis. The new Rotor-Gene Q purchased by CDU enables streamline analysis for a wide range of applications, in particular gene expression analysis.

The Rotor-Gene Q will be used as part of the Water Quality and Biodiversity project to amplify specific genes associated with the nitrogen cycle to provide insight into nutrient cycling in Darwin Harbour.

The opportunity to streamline analysis and develop 'N' cycle gene probes for routine monitoring is an exciting prospect for monitoring effort in the region.

Building local capacity and training for Sea Rangers

Opportunities to provide training and to build the local capacity of Larrakia Sea Rangers continues to be incorporated into the program where possible. Rangers have had the opportunity to work with field staff to develop skills in water and sediment quality sampling. This program with a number of others in the Darwin region is helping young indigenous people develop skills

It is intended that further opportunities for rangers to develop laboratory skills will be pursued. Initially tasks associated with sample preparation will be provided to rangers where they can develop some basic laboratory skills



Larrakia Sea Ranger, Ateru Taltol assisting in collecting sediments using a corer instrument on the Blackmore River.

