

Guidelines for Expressions of Interest and Applications

1.0 Background

Raine Island Recovery Project

The Raine Island Recovery Project (RIRP) is a five year, \$7.995M collaboration between BHP, the Queensland Government, the Great Barrier Reef Marine Park Authority, the Wuthathi Nation and Kemer Kemer Meriam Nation (Ugar, Mer, Erub) Traditional Owners and the Great Barrier Reef Foundation to protect and restore the island's critical habitat to ensure the future of key marine species, including green turtles and seabirds.

Raine Island supports the world's largest nesting population of the globally endangered green turtle. Approximately 90% of the northern Great Barrier Reef's green turtle population breeds here, making it the most significant breeding site in the world for green turtles and it's also home to the most important seabird rookery in the Great Barrier Reef World Heritage area.

Research and monitoring over the last 40 years indicates that the northern Great Barrier Reef green turtle population is in the early stage of decline, and that Raine Island has been failing as a turtle rookery since the late 1990s.

Studies at Raine Island have indicated that hatching success is highly variable but that, on average, figures are much lower than would be expected for a normally-functioning turtle rookery, with a large proportion of clutches totally or partially failing to hatch. There is also a high degree of early embryonic mortality, with many embryos dying in the early stages of development.

Studies of possible causes of reduced hatching success have looked at inundation, with beach re-profiling showing marked improvement in hatching success in areas raised above previously inundated levels. However, considerable hatching failure continues to be recorded, which indicates other factors influencing hatching success apart from inundation such as microbial load, changes in the gas environment, and impacts of nesting density.

The overarching outcomes of the RIRP are to:

- Increased nesting success
- Decrease clutch destruction
- Increase hatching success/emergence success of clutches
- Increase hatchling numbers
- Ensure seabird population remain within limits of acceptable change that maximise population viability
- Build Indigenous ranger capacity

This specific research project within the RIRP seeks to address whether there is a relationship between nest micro-environment and hatching failure on Raine Island.

Project Governance

Reference Group

The Reference Group coordinates the efficient and effective planning and implementation of the RIRP. The Reference Group will advise on the measures required to achieve RIRP outcomes and provide advice on available science, information and monitoring, from across several government departments and organisations. It will also facilitate information exchange and advice on efficient identification and allocation of resources towards RIRP delivery. A key focus is to advise on strategies to reduce future impacts on Raine Island, focusing on long term resilience and sustainability.

Reference Group considerations and activities will be consistent with current legislation, particularly the state *Nature Conservation Act 1992* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*, as well as any other relevant management arrangements which are in place including the Raine Island Indigenous Land Use Agreement (ILUA).

Scientific Advisory Group

The Raine Island Recovery Project Scientific Advisory Group (RIRPSAG) provides advice to the Reference Group and the RIRP management team on the scientific rigour of the research and monitoring, and adaptive management actions that are delivered under the RIRP. The advice will be supported by the best available science and/or expert judgment, be robust in design and will provide an evidence base to improve the resilience of green turtle and seabird populations at Raine Island within the boundaries of the Raine Island National Park (Scientific).

The RIRPSAG will provide transparent and robust advice. The RIRPSAG will adopt a forward-thinking, no regrets approach and advise on the monitoring and research required to achieve RIRP outcomes and provide advice on available science, information and monitoring, from across several departments and organisations. It will also facilitate information exchange and advice on efficient identification and allocation of resources towards project delivery. A key focus is to provide advice and assist in the design, development, and, where appropriate, implementation of experiments to test whether management strategies are meeting the objectives of the RIRP.

The considerations and activities will be consistent with current legislation, particularly the state *Nature Conservation Act 1992* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*, as well as any other relevant management arrangements which may be in place from time to time, such as the Raine Island ILUA.

Nesting Summit – Research Priorities

The RIRPSAG recommended that a group of experts from around the world should be invited to critically discuss the factors that could be influencing hatching failure at Raine Island and identify potential research and adaptive management actions to mitigate these issues.

A Raine Island Turtle Nesting Summit was held in Brisbane (Australia) on 16-17 May 2017, with the broad aim of exploring research priorities and gaps to help to restore

Raine Island ecosystem function and build resilience in the northern Great Barrier Reef green turtle population.

The purpose of the Summit was to help restore Raine Island ecosystem functions and build resilience in the northern Great Barrier Reef green turtle population by:

- Bringing together international experts to better understand the issues influencing turtle hatching failure at Raine Island.
- Identifying potential priority research and adaptive management actions to mitigate suspected causes of turtle hatching failure.
- Establishing high-level scientific project design and adaptive management feedback criteria.

The Summit was particularly interested in those life cycle stages of the northern GBR green turtle population that occur on Raine Island and are more amenable to research, monitoring and adaptive management intervention. A copy of the Nesting Summit Outcome report can be obtained by emailing Raineresearch@npsr.qld.gov.au.

The RIRPSAG endorsed the outcomes of the Nesting Summit. **This Expression of Interest round focuses on the highest priority research gaps identified during the summit.**

2.0 Research Project Objective

The objective is to understand whether there is a relationship between nest micro-environment and hatching failure on Raine Island.

The overarching aim of research is to support the RIRP, to achieve the project's outcomes listed in the Background section of this document.

3.0 Research Project Scope

Research is required to contribute to:

- Understanding the relationship between the green turtle nest micro-environment (for example, respiratory gases, temperature, moisture, particle type and size, salinity, microbial load, and community) on Raine Island and its influence on nesting success, hatching success, hatchling quality and hatchling sex ratios.

Large-scale multi-disciplinary collaboration is encouraged.

3.1 Methods

- The choice of methods is a matter for the proponent but could include, for example, desktop studies (including data modelling), laboratory experiments (aquaria, mesocosm), and field work.
- The majority of field work occurs during the nesting season from October to March. The Queensland Parks and Wildlife (QPWS) vessel, the Reef Ranger, visits Raine Island 4-5 times during nesting season. These trips are approximately 12 days. The proponent will need to undertake any field work on Raine Island as part of these trips.

- There are logistical and other constraints to working on Raine Island. The proponent is encouraged to consider laboratory research or research at other turtle rookeries.
- EOI Applications must outline:
 - the amount of time research project activities will take on each trip (e.g. 2 half days per trip, over 3 trips per season),
 - the proponent's ability to participate in general monitoring and other work while on the island,
 - vessel requirements, including the personnel/berths, equipment/logistical support required on each trip,
 - justification of why the research project needs to be undertaken on Raine Island (e.g. as opposed to another site),
 - why the proponent needs to be on the island and/or whether parts of the research project can be carried out by RIRP staff.
- Raine Island is a protected national park (scientific) in its entirety and is not accessible to the public. The proponent may need to be granted a research permit to undertake work on the island.
- Workplace, health and safety is of prime importance when working at Raine Island. The work environment is remote, hot and physically demanding. The living quarters are vessel based with up to 16 participants for approximately two weeks. These are close and challenging conditions requiring respect, teamwork and experience in similar situations.

Existing monitoring and infrastructure

- Existing infrastructure – Raine Island has an existing network of monitoring equipment including:
 - base station consisting of two x 3m containers, one for storage and the other as the electronics base;
 - electronics base with 2kW solar power and satellite communications, Vaisala weather station, 5m tower, video and SLR still night-time monitoring camera and differential GPS base station;
 - three smaller power stations, 0.5kW each, with 5m tower mounted, one with PTZ video camera and all three with SLR night-time still camera. Towers are WiFi linked back to the base station. Cameras are linked and controllable live via satellite;
 - four monitoring towers, situated above the cliff, adjacent to the nesting beach in the four quadrants of the island;
 - four cross-beach transects each with 4 x TinyTag temperature loggers;
 - four cross beach transects each with 3 x bore posts and sub-surface In-Situ Troll 500 loggers to measure tidal inundation level of the nesting beach;
 - drone equipment (DJI Inspire2 or equivalent) through collaborating researchers; and

- differential GPS survey equipment and trained operator on each trip.
- Existing monitoring – green turtle monitoring has been undertaken at Raine Island since 1975. The extent and frequency of monitoring has been increased since 2010 and currently consists of:
 - four field trips during turtle breeding season (October to April) and a mid-year trip;
 - monitoring for nesting success and hatchling production comparing re-profiled and control areas of the nesting beach (replicates of three nights each during each trip);
 - hatching success monitored from clutches marked as laid throughout the nesting beach. Approximately 150 nests per trip are marked in December and February trips and exhumed 60 days later;
 - population census using mark–recapture methods during December and February trips;
 - full time remote monitoring of nest level temperature and tidal inundation using equipment described above;
 - full time weather monitoring of wind speed and direction, air temperature, rainfall, humidity and barometric pressure;
 - drone mapping of island topography and recording for turtle population census mark-resight counts.; and
 - dGPS (1998 – present) and drone (2014 - present) topographic surveys of the island conducted on all trips.

3.2 Key deliverables and tasks

- A report to the RIRP detailing the relationship between the nest micro-environment on Raine Island and nest success, hatch success, hatchling quality and hatchling sex.
- Peer reviewed publication of outcomes.
- Recommendations on potential adaptive management actions to improve green turtle reproduction at Raine Island.
- Research undertaken needs to be pragmatically based to inform and/or evaluate management decisions on the island rather than being ‘pure’ research.

Key tasks

- Undertake research to improve hatching success on Raine Island.
- Identify the relationship between the nest micro-environment on Raine Island and nesting success, hatching success, hatchling quality and hatchling sex. This includes the identification and testing of appropriate factors that may affect hatching success.

4.0 Timeframes

Funding will be provided for up to two years. Proponents may apply for projects that span one or two years. Successful applicants will be subject to a staged approach between year 1 and year 2, subject to satisfactory performance.

5.0 Indicative Budget

A maximum of \$400 000 (excluding GST) is available to fund research. Proposals for more than \$400K will not be considered. It is expected that most proposals will be significantly less.

On-costs from institutions must be clearly identified.

6.0 Other Conditions

- Traditional Owners play a key role in the management of Raine Island, and cultural heritage considerations will be applied to any research proposed on the island. Outcomes of the research project must be communicated effectively to the Traditional Owner groups by the proponent. It is envisaged that this would include on-country presentations by the proponents requiring a budgeted amount of approximately \$20,000.
- The proponent must be able to contribute to monitoring and other work while on Raine Island, carried out under the auspices of RIRP staff and QPWS Rangers.
- Collaboration and co-contribution are strongly encouraged where appropriate.
- An interview of applicants may be required in the second (full application) stage of selection.

7.0 Further Information

Applicants are strongly encouraged to contact Dr Andy Dunstan (Senior Conservation Officer, Raine Island Recovery Project) to discuss their EOI application. Email: Rainereserach@npsr.qld.gov.au

Technical reports from the RIRP can be provided as additional background information. Please email Rainereserach@npsr.qld.gov.au to obtain copies of these. Applicants are encouraged to review these background documents.

Further information about the EOI process: Email – Raineresearch@npsr.qld.gov.au