



Australian Government

Department of the Environment and Water Resources

**Marine and Tropical Sciences Research Facility (MTSRF)
June 2007 Milestone Report**

Project 2.5ii.4: Impacts of Climate Change on Biodiversity

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Summary

The project remains on task for the completion of the first year of research with all milestones met. There has been continued progress made on the analysis of extinction proneness and ecological characteristics of species with the metadata collection being completed and the more complex data analysis phase starting.

The generation of new species distributions models and biodiversity mapping is progressing well. New Maxent modelling has been conducted on over 200 species of rainforest vertebrates. Models have then been adjusted to provide both potential and realised distributions. These models can now be combined to give the most accurate and up-to-date maps of vertebrate biodiversity possible in the region. The next step is then to apply the new regional climate predictions from Project 2.5ii1 to produce various scenario models for future impacts and impact prediction from climate change. The field collection of data on faunal distribution was carried out on a fieldtrips in March which surveyed species at all of the primary field sites and supplemented by monthly field trips carried out in the status and trends project. Monthly trips have been carried out to continue to collect microclimate data and measures of Net Primary Productivity.

The next milestone report will see the progress update on analysis of extinction risk data, a draft report on the MaxEnt species distribution modelling and summary of meeting which have taken place.

For reference: Milestone extracted from Project Schedule

Report 3 submission

- Progress report and preliminary analysis on the links between extinction proneness and ecological characteristics of each species using collation of existing data and literature.
- Progress update on spatial modeling of species distributions and biodiversity patterns (obj a).
- Progress and status report on data collected as part of objectives b-e (above).
- Summary of communication activities undertaken through the course of year 1 of project.
- Plan for completion of out year activities.

Project Results

DESCRIPTION OF THE RESULTS ACHIEVED FOR THIS MILESTONE

This project is currently on task with progress on the following milestones described below:

1. Progress report on the links between extinction proneness and ecological characteristics of each species using collation of existing data and literature.

Following on from the progress in the last report, the database of life history and ecological variables is now complete. We have updated estimates of range size, relative abundance and population density developed from MaxEnt models of each species range. A ranked estimate of movement capacity has also been determined for each species, based on body size, type of movement (i.e. flight, terrestrial) and known home range and movement data. We also have estimates of elevational range, temperature range, diet, and vegetation specialization based on database records of observations for each species. Now that the species characteristics database is complete, we are now working on developing models to predict relative extinction proneness in each species. We plan to use a number of different methods to determine how the models compare and which is most accurate, including qualitative risk assessment models, commonly used in fisheries research where little is known of population sizes and fluctuations of by-catch species. We will also use Non-Metric Multidimensional Scaling to determine which species cluster together in terms of their life history and ecological characteristics. Finally, we will use decision tree analysis to allocate species into four groups of extinction proneness, from low, moderate, high and very high. We will compare results to the actual conservation status of species listed under the IUCN and Nature Conservation Act.

2. Progress update on spatial modeling of species distributions and biodiversity patterns (obj a).

The potential distributions for some 200+ rainforest species have been created using MaxEnt. These models have been checked for errors with respect to both errors of omission and commission. These were then clipped by known extents of the species ranges to create realized distributions. It is these realized distributions that will be used further for examining patterns of biodiversity in the region.

3. Progress and status report on data collected as part of objectives b-e (above).

The collection of baseline continues with monthly field trips occurring to: download Hobo dataloggers to collect micro-climatic data, measure tree growth and collect leaf litter samples, clear insect pitfall and flight intercept traps.

Field trips for surveys of fauna were carried out during March in which a majority of the primary field sites were surveyed. Surveys of birds, reptiles, mammals, insects and NPP were carried out. Faunal surveying and monthly monitoring will occur again in June at the primary sites.

4. Summary of communication activities undertaken through the course of year 1 of project.

The communication activities have consisted of many one-on-one discussions between project members however larger group meetings have occurred in Feb and May 2007. At

these meeting the progress to date and future directions of the project has been discussed. Five of our project members also attended the MTSRF conference in April.

Both Jeremy Vanderwal and Steve Williams have also attended numerous meeting in Cairns to discuss across project details with the Status and Trends project. Steve Williams has met with Andrew Krockenburger and Johan Larson to initialise the physiology work which will occur in this project. Steve Williams, Dave Hilbert, Luke Shoo and Suppiah Ramasamy met to discuss the regional climate prediction to come from project 2.5ii1 and to agree on the future climate scenarios that we will all model impacts on.

5. Plan for completion of out year activities.

Plans for completion of out year activities are still currently on task with the major outputs for the next 12 month period will include:

- Completion of report on extinction risk of Wet Tropics vertebrate species
- Ensemble modelling of species distributions and predictive impact modelling
- Preliminary report on ecological plasticity and thermal buffering in refugial habitats

Explanation of Activity changes

No activity changes have occurred during this reporting period.

Problems and opportunities

In previous reports we had acknowledged the fact that we were unable to carry out monthly data collection at three of the permanent sites. Road access is now open and sampling will occur as per originally discussed in our project. We have been exploring opportunities for expanding the biodiversity / climate change research into the savanna woodlands to the west of the Wet Tropics via collaborations with CSIRO, Burdekin Dry Tropics NRM and EPA.

Other issues

There are currently no other issues which require reporting.

Communications, major activities or events

During milestone reporting period

A small meeting was held on 10 May to update all researcher in this group on the progress to date. Joanne Isaac presented her work and the phylogenies which she has generated to include in her analysis. Andrew, Luke and Steve discussed parts of the Physiology project and what progress has been made. Research output for the next six-month period was discussed.

Student Training workshops.

The Centre for Tropical Biodiversity and Climate Change has organized and run three workshops to train staff and students within the centre (including MTSRF funded projects). These days provided information and training on:

- Data basing – efficient data storage and retrieval, entering and extracting data from the CTBCC data base

- GIS day – teaching and informing students, post-docs and collaborators on the availability of spatial resources (eg. Climate data, vegetation mapping etc) and how to utilize these resources in their research.
- Communicating your research. A workshop aimed at teaching and informing post-graduate students on the techniques, pitfalls, dos and don'ts of publication and communication of their research. Utilised both senior staff and post-docs in a mentoring capacity.

Steve Williams has attended the MTSRF meeting in Townsville in April, WTMA scientific advisory meeting in May and presented public information lectures in Ayr and Sydney.

During next milestone reporting period

A group meeting including students all associated with the CTBCC and a large group of external collaborators and end users will be invited to attend a meeting to be carried out at Paluma on 5 and 6 July. The outcomes of this meeting will be reported in the next milestones report.

Project direction and progress will be discussed in a meeting with all project group members in Nov/ Dec.

Forecast variations to planned milestones

No variations are currently forecast for the planned milestones.