Black-footed tree-rat, photo Dr Alaric Fisher.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

Prioritising threatened species in northern Australia

Wrap-up factsheet

Little is known about many species in northern Australia

The characteristics of northern Australia that have allowed it to maintain a rich diversity of plants and animals – rugged, remote and sparsely populated – also means that there are substantial gaps in our knowledge of where these species occur and how they will be affected by environmental change and development activities. As interest in expanding mining and agriculture in the north increases, the lack of information about species of conservation concern hinders the ability of federal, state and territory agencies to make decisions that will avert the ongoing decline and potential extinction of these species. This project addressed three critical knowledge gaps: where are species of conservation concern; which parts of the landscape are most affected by the processes that threaten these species; and, in the face of these threats, where are areas that can be prioritised for conservation management?

Invasive grass species can alter landscapes and their existing fire patterns, photo NESP Northern Hub.

Key outcomes

This research generated four data sets:

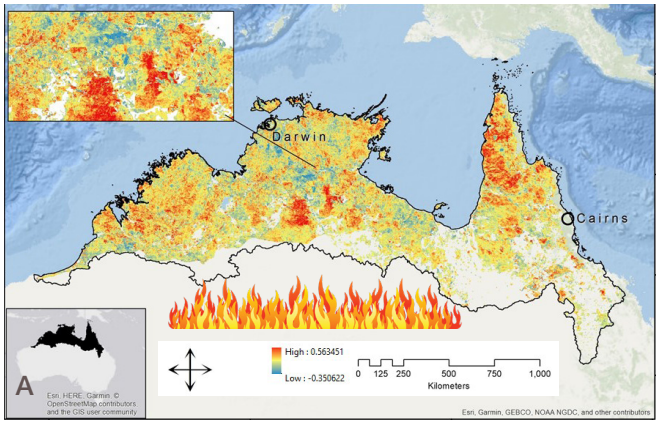
1. High resolution maps of the distribution of 1425 plant and animal species of conservation concern from both terrestrial and freshwater ecosystems.
2. Hotspot maps that show the numbers of species of conservation concern in a particular area. Species can be grouped by type (e.g. plant, reptile) or by conservation status (e.g. vulnerable, threatened).
3. Maps of the key threatening processes that have an impact on terrestrial and freshwater species in northern Australia.
4. Maps of vulnerability that combine information on a species' distribution with the extent of threatening processes and the sensitivity of that species to the threat.

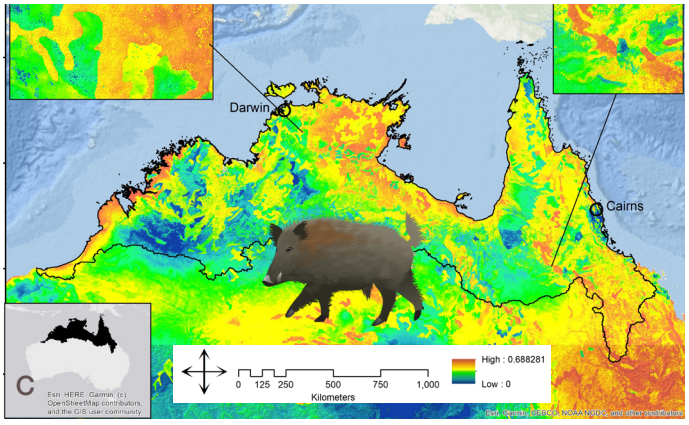
Data collation and visualisation to support conservation decisions

Maps of the distribution of species and the threats they face are an effective tool to visualise the places in the landscape where species are most at risk from threatening processes or, conversely, where the best opportunities for conservation exist. Distribution and threat maps also reveal the areas where little information is available and more targeted survey work is necessary.

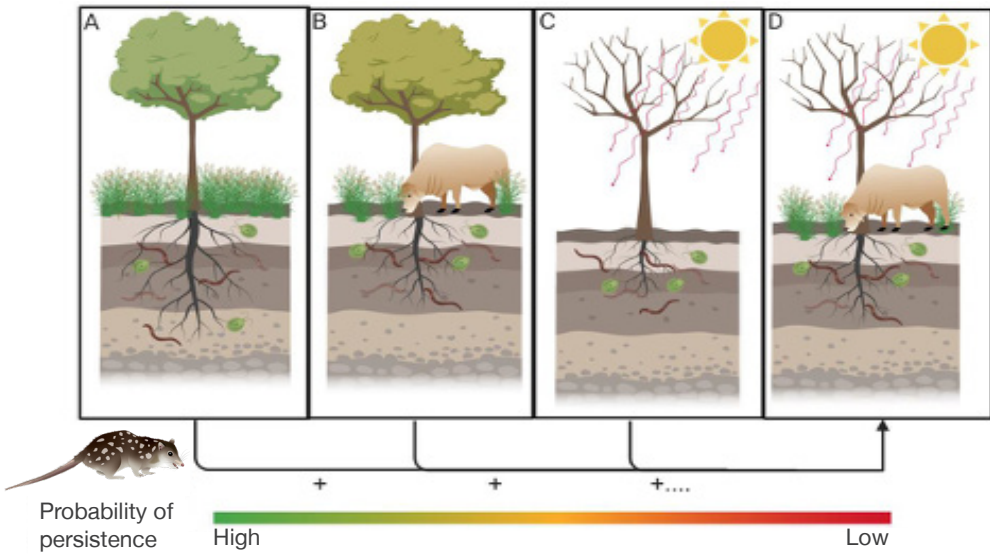
The project has created distribution maps of 1425 terrestrial and freshwater species listed as rare, threatened, near-threatened or range restricted, and has mapped 11 threatening processes across northern Australia (land clearing from intensive agriculture; heat and drought associated with climate change; transmission of wildlife disease; changes in fire regimes; changes in streamflow; grazing; invasive species; mining activities; inundation and sea-level rise; accessibility to overexploitation; and urbanisation). Maps of each species vulnerability to extinction were created by combining information on species distributions, the extent of threats, and the sensitivity of the species to each threat.

These maps can help managers to prioritise which species need most urgent conservation management, by identifying those species exposed to multiple processes that threaten their survival.





Mapping areas where fire frequency and timing are different from typical (A) can inform on-ground management including areas invaded by grassy weeds (B, photo Glenn Campbell). Mapping feral pig (Sus scrofa) *habitat suitability across northern Australia (C) can assist long-term management of this invasive species (D, photo Michael Lawrence-Taylor).*



An example of how cumulative vulnerability was calculated for the Northern Quoll (Dasyurus hallucatus) *using two threats it's sensitive to. A) Northern Quoll suitable habitat combined with B) where overgrazing pressure occurs and how sensitive quolls are to this plus C) where future temperature increases under climate change occur and how sensitive quolls are to this threat leads to D) the cumulative vulnerability of quolls to these two example threats.*

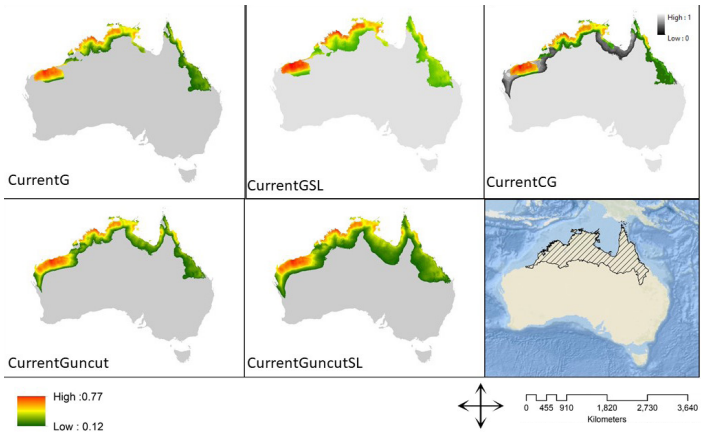
User guide for maps and data

The User Guide explains the output files available for public access and how they were constructed from the available data and expert input. The guide also outlines the limitations of each data set and provides guidance on the appropriate use of the data given these limitations.

The amount of information available about many of the species of conservation concern and several of the threatening processes was limited, and the user guide clearly explains the caveats of how the data and maps should be interpreted, especially when used to prioritise management decisions.

For example, a range of distribution models is available for each species, based on the 'thresholds' of accuracy applied to the data (e.g. places where species are likely to occur as opposed to where they might occur).

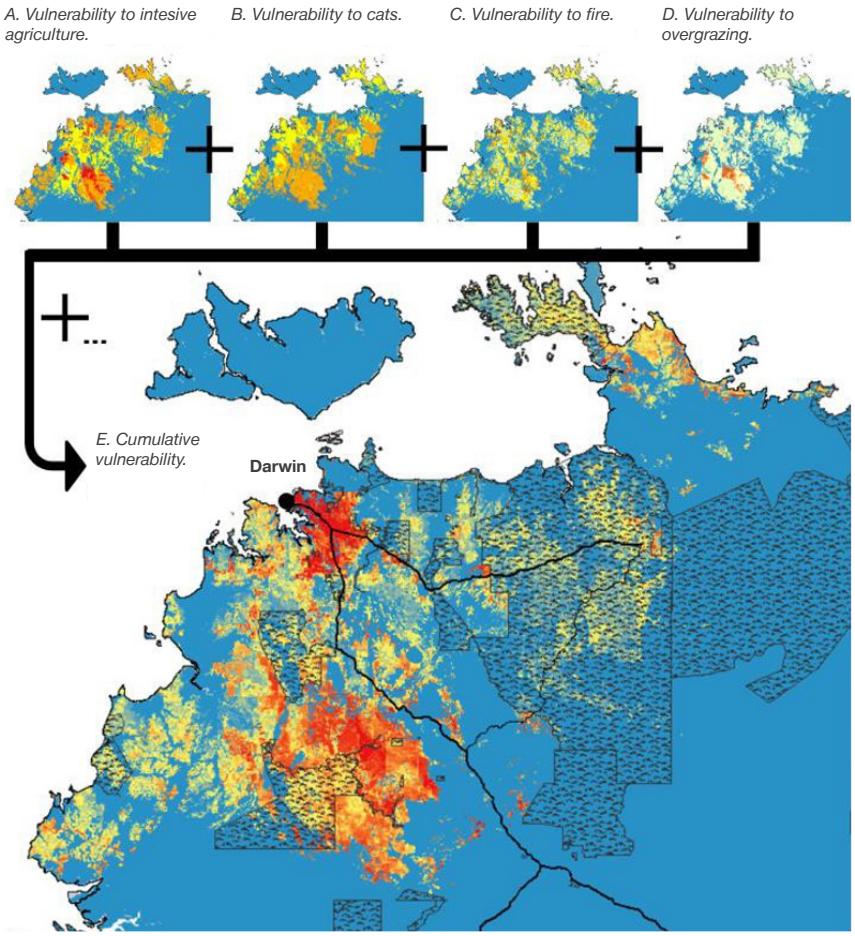
The output maps show a statistical model of habitat suitability but these areas may not actually be occupied by the species at present. On-ground assessments are crucial to make an informed assessment of the suitability of any management activities.



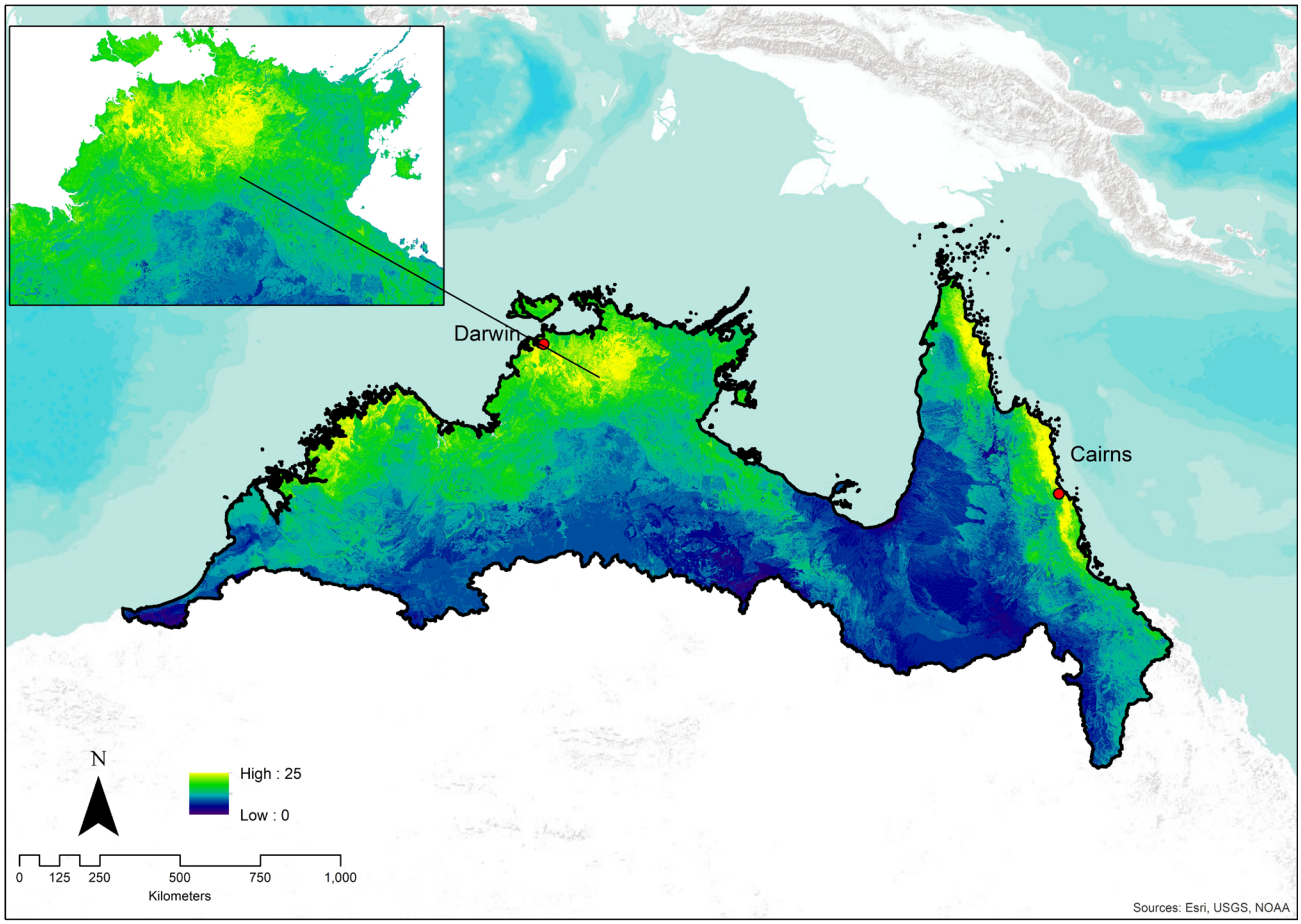
Examples of the variety of distribution maps available for the Northern Quoll. See User Guide for naming conventions.

Flexible data options allow managers to consider multiple threats to multiple species

The data management system for the project has been designed so that the data and maps can be accessed in a flexible way. For any given species, the distribution map can be used to show where a species of interest occurs, while the vulnerability maps can be used to show where this species is most at risk based on its exposure and sensitivity to a certain threat. As another example, the project created several different types of maps of the distribution of invasive species that can be used to guide different management activities, such as eradicating predators from strategic areas or targeting weed control in reserves. Cumulative vulnerability maps can be used to understand how vulnerable a species is to the combination of threats that occur across its range. By adding together the total vulnerability of all species within a group, such as mammals, to all of the threats, managers can consider the combined vulnerability of all mammals in northern Australia to all threatening processes.



Individual vulnerabilities to threatening processes such as intensive agriculture, feral cats, fire regime alterations, overgrazing, and other threats, were combined into a cumulative vulnerability for the endangered Black-footed Tree-rat (Mesembriomys gouldii gouldii)*. Major roads are shown as black lines and protected areas as black-patterned areas.*



Example hotspot map showing mammal species richness across northern Australia.

How can the data be accessed?

The data created from the project is available to the public, free of charge. The data collection, including the original spatial grid files, is held in a database managed by James Cook University (JCU). This database is also accessible through an online portal published on the project's website. An overview of the data directories is given in the User Guide. Various formats of the data will also be available through the Atlas of Living Australia. Owing to the sensitive nature of some of the information, members of the public wishing to access certain data sets must receive approval by contacting Dr Anna Pintor of JCU.

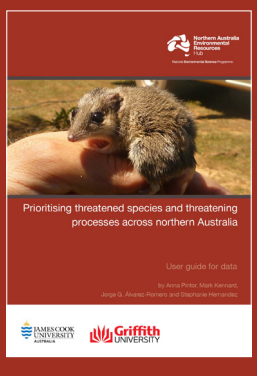
Further information

This project was led by Dr Anna Pintor from James Cook University (JCU) and Associate Professor Mark Kennard from Griffith University, assisted by Stephanie Hernandez from JCU.

Contact:
stephanie.hernandez@jcu.edu.au

annafvp@gmail.com

This factsheet, user guide and further information are available from the project webpage at nespnorthern.edu.au/projects/nesp/prioritising-threatened-species



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