Prioritising threatened species in northern Australia

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Anna Pintor, James Cook University
and Mark Kennard, Griffith University

Northern Australia Environmental Resources Hub

National Environmental Science Programme

World class research to support sustainable development in northern Australia

Northern Australia's unique and rich biodiversity faces numerous threats but we have limited knowledge on the distribution of rare and threatened species, and on how exposed and sensitive species are to various threatening processes. These knowledge gaps limit the efficiency and adequacy of conservation actions and simultaneously create uncertainty for development in the north. This project aims to fill these knowledge gaps with maps that can guide land and water management, policy and assessments.

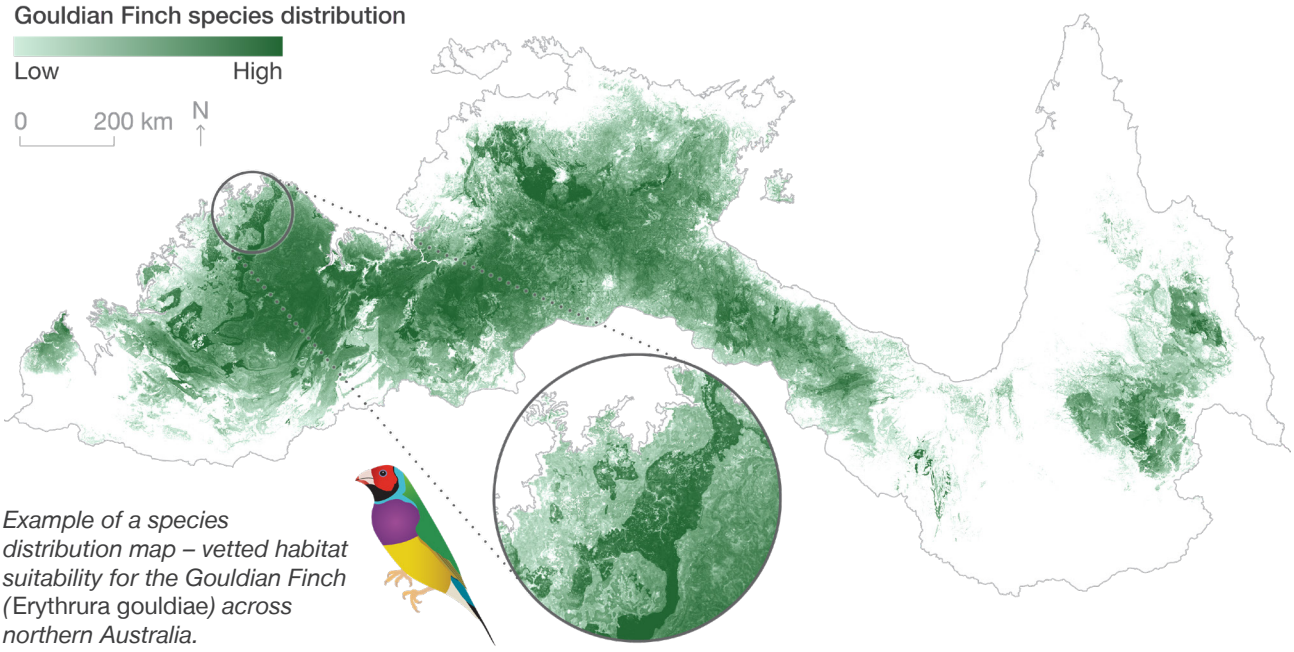
What's new?

This research has generated four types of product to date:

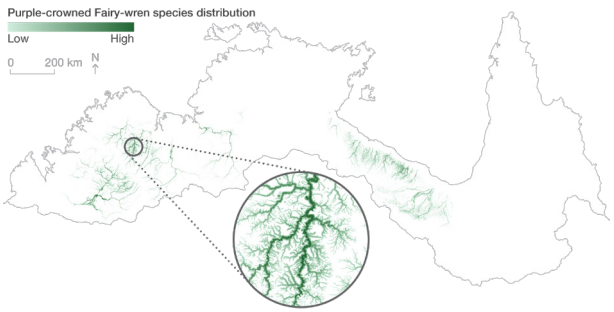
1. maps of rare and threatened species distributions
2. hotspot maps showing concentration of rare and threatened species
3. maps of the main threatening processes in northern Australia
4. an expert estimation of species' sensitivity to threats.

Your feedback on these initial products is welcome.

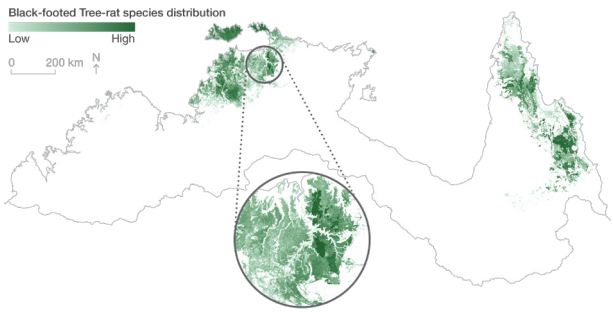
1. **High-resolution maps of the distributions** of >1,400 rare or threatened plant and animal species (terrestrial and freshwater) based on habitat suitability and expert knowledge.



*Example of a species distribution map – vetted habitat suitability for the Gouldian Finch (*Erythrura gouldiae*) across northern Australia.*

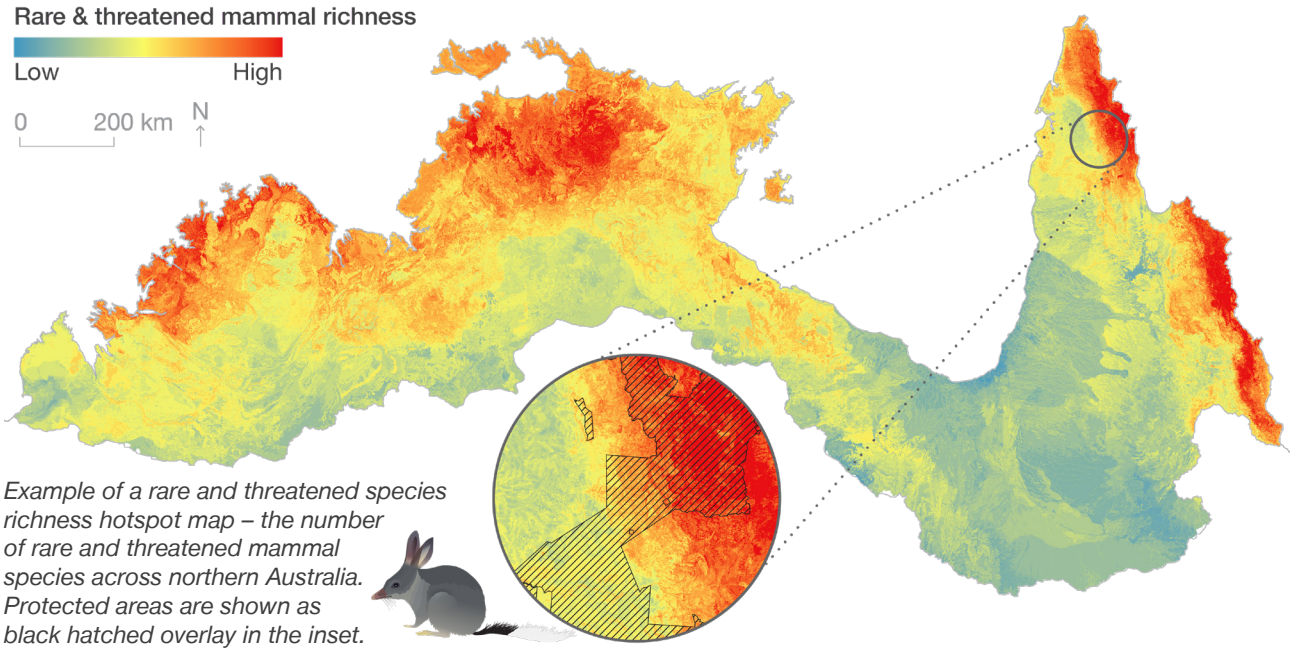


*Species distribution map for the Purple-crowned Fairy-wren (*Malurus coronatus coronatus*).*



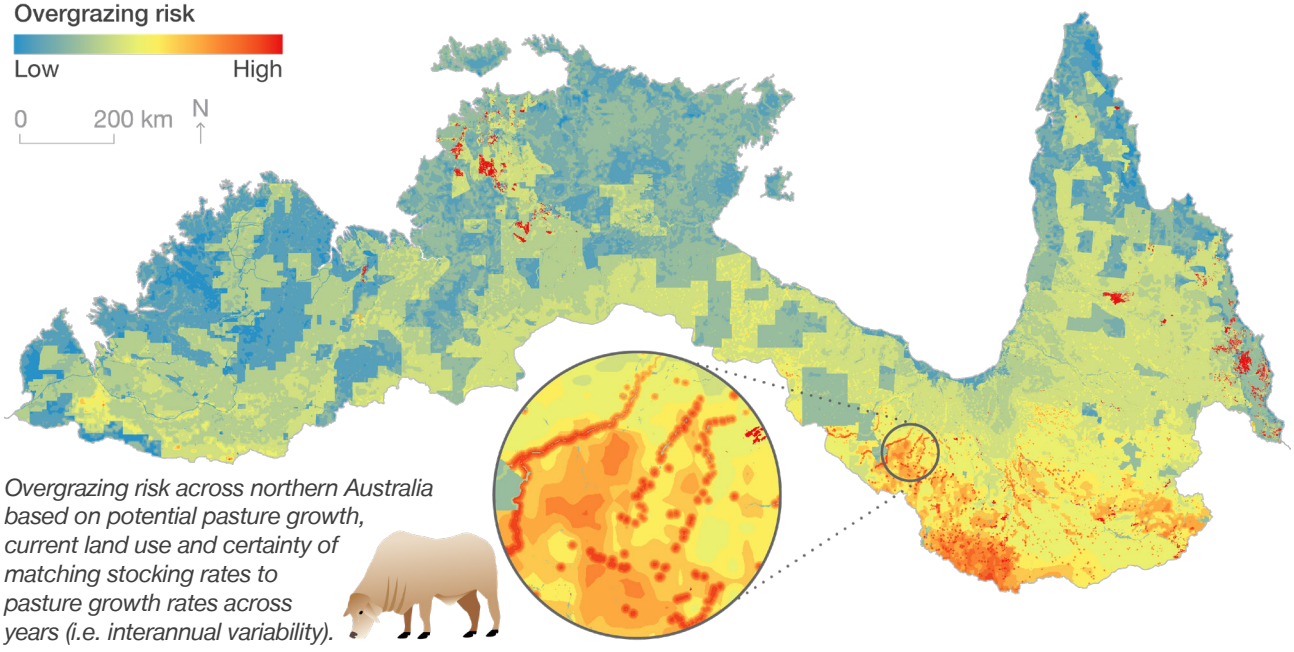
*Species distribution map for the Black-footed Tree-rat (*Mesembriomys gouldii gouldii*).*

2. **Hotspot maps** that show concentrations – or richness – of rare and threatened species within different taxonomic groups.

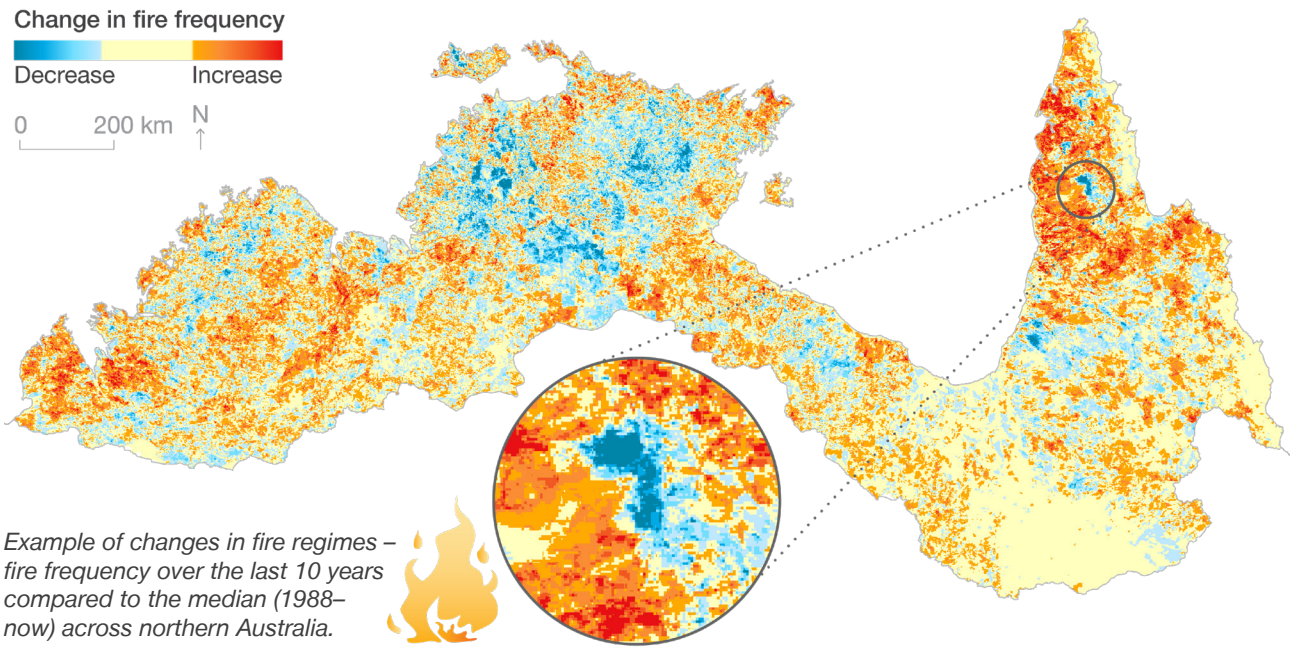


Example of a rare and threatened species richness hotspot map – the number of rare and threatened mammal species across northern Australia. Protected areas are shown as black hatched overlay in the inset.

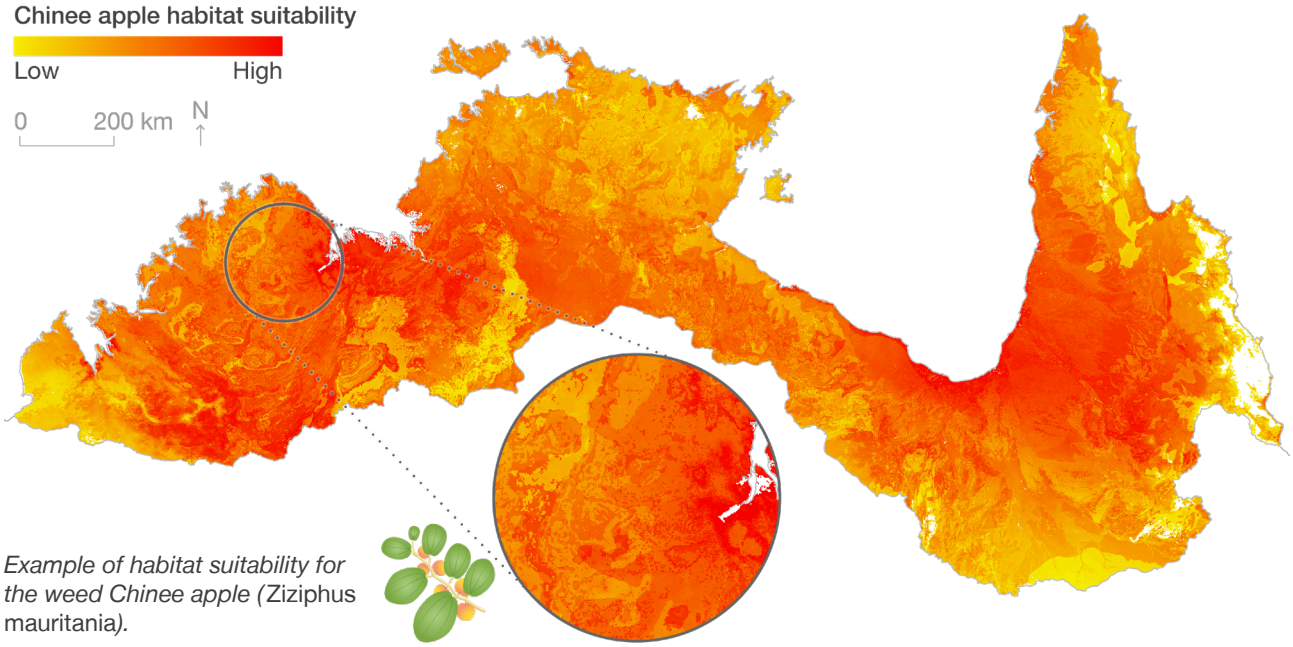
3. **Maps of the key threatening processes** impacting northern Australian biodiversity. These include:
   - estimates of spatial variation in overgrazing risk
   - changes in fire frequency and seasonal timing compared to long-term (1988–now) averages and compared to typical fire regimes for vegetation types
   - habitat suitability for >250 weeds, feral animal species and wildlife diseases
   - distribution of current agricultural areas
   - intensity of urbanisation based on land use and population size
   - threats to stream flow regimes due to climate change or human modification
   - predicted changes in climate 'stressors' such as increased or prolonged heat and drought periods
   - mining and exploration activities collated from state/territory and federal databases



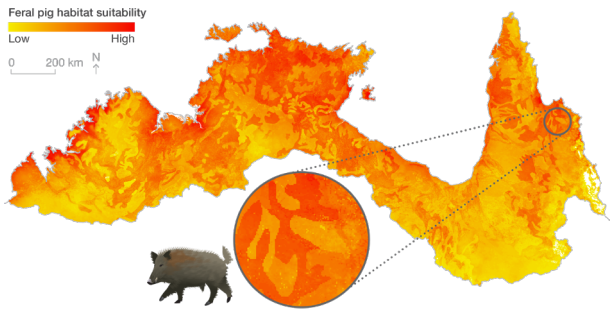
Overgrazing risk across northern Australia based on potential pasture growth, current land use and certainty of matching stocking rates to pasture growth rates across years (i.e. interannual variability).



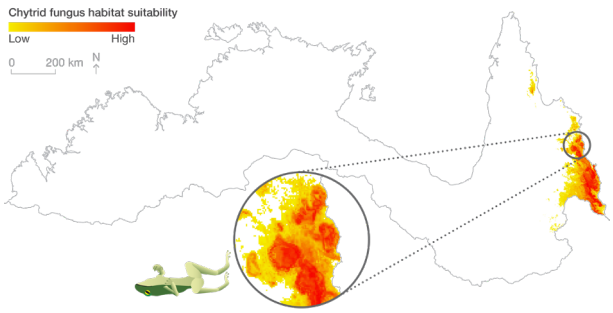
Example of changes in fire regimes – fire frequency over the last 10 years compared to the median (1988–now) across northern Australia.



*Example of habitat suitability for the weed Chinee apple (*Ziziphus mauritania*).*

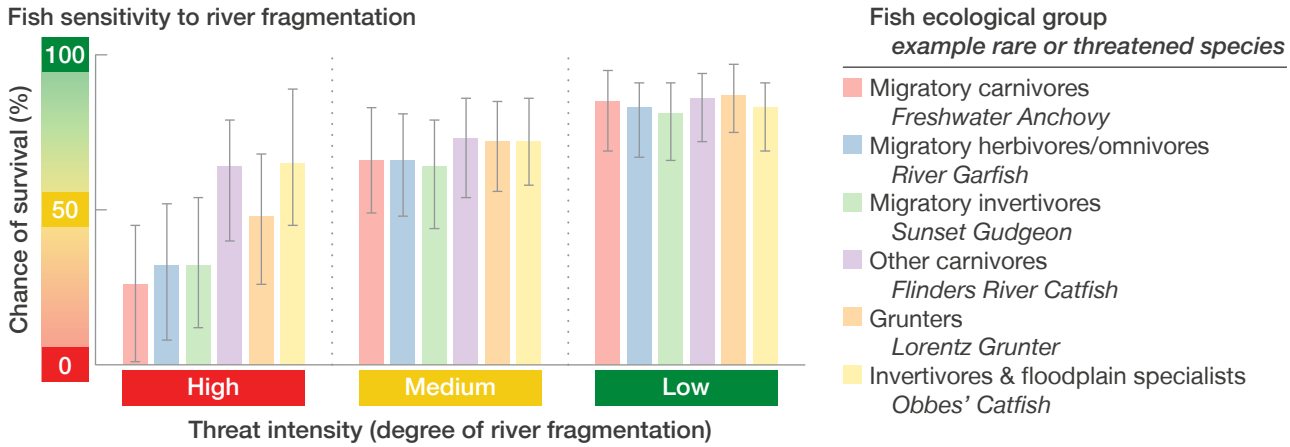


*Habitat suitability map for feral pigs (*Sus scrofa*) across northern Australia.*



*Habitat suitability map for chytrid fungus (*Batrachochytrium dendrobatidis*), a frog disease.*

4. We have also used expert elicitation to estimate the **sensitivity** of different ecological groups of species to each threat if exposed to it.



Sensitivity of freshwater fish ecological groups to the threat of river fragmentation caused by water infrastructure (e.g. dams and weirs). Groups with low chance of survival (y-axis) are highly sensitive to the threat (estimated using expert elicitation). Survival is defined as the maintenance of populations of a species at high enough levels to perform their ecological function over 20 years. The values shown are the average best-guess estimates (bar height) and the average of the upper and lower bounds (error bars).

What's next?

The team is now working on combining the maps of where rare and threatened species live with the maps of threatening processes and information on how sensitive the species are to those threats. This will result in maps that identify areas of high vulnerability – in other words, areas where rare and threatened species coincide with their most significant threats and which may need targeted management. We'll then work with government agencies and others to develop a practical guide that includes case-study examples on interpreting maps for prioritisation, policy and management needs. Questions we'll be asking include:

- Where do rare and threatened species live and how do they vary in their sensitivity to different threats?
- Where are the areas of highest threat and how might these change in the future?
- Do conservation reserves coincide with where rare and threatened species actually live?
- How can we best prioritise rare and threatened species recovery actions based on identifying areas of high vulnerability?

Please contact us if you're interested in being involved or have any feedback on our initial products.

Further information

Contact Dr Anna Pintor at anna.pintor1@jcu.edu.au or Associate Professor Mark Kennard at m.kennard@griffith.edu.au

The project page can be found at nespnorthern.edu.au, along with the start-up factsheet.

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