Threatened species research gaps and priorities for the Department of Conservation Te Papa Atawhai

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Summary

Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 calls for all threatened species in Aotearoa to be managed by 2030 to prevent further human-induced extinctions. However, < 2% of the more than 4000 taxa[1] that have been categorised as Threatened or At Risk are currently being managed to a standard that will ensure their long-term persistence. A key reason why more taxa are not being effectively managed is because of a lack of knowledge or tools to do so.

A research gap analysis was undertaken in 2020 to identify the knowledge needed to develop or improve effective management actions to secure the majority of Threatened and At Risk – Declining taxa. A total of 1068 taxa were included in this analysis.

Experts first listed the research needs for the management of each taxon. A score between 0 and 30 was then given to each taxon based on (a) *urgency* according to its New Zealand Threat Classification System conservation status; (b) *knowledge gains*, which reflected the number of other Threatened and At Risk – Declining taxa that would benefit from the proposed research; and (c) the amount of *previous relevant research* that could inform the development or improvement of management actions.

Key findings

- Hundreds of knowledge gaps were identified, all of which are recorded in the Online Supplementary Information [https://www.doc.govt.nz/globalassets/documents/science-and-technical/threatened-species-research-gaps.xlsx]
- Of the 1068 taxa assessed:
  - 83 (8%) require no new research to develop or improve management actions
  - 21 (2%) only require research to resolve their taxonomic status or a formal taxonomic description
  - the remaining 964 (90%) require research under at least one of four broad research categories: understanding the causes of decline (34% of all taxa), developing new management plans (54%), improving existing management plans (35%), and developing detection and monitoring methods (38%).
- Of the 421 taxa that already have management plans, 329 (88%) require significant new knowledge to improve these, as not all pressures or methods to mitigate them are understood well enough to provide effective management.
- Most taxa with high scores (≥ 21) were terrestrial or freshwater invertebrates, reflecting the numerical dominance of these groups and a relative lack of historical research to inform their conservation management.
- Many taxa had similar knowledge gaps, allowing broad research topics to be identified that would address common gaps within and across taxonomic groups.

1 Many of the threatened species in Aotearoa have not yet been formally described or are recognised as several distinct subspecies, each of which requires protection. Therefore, the term 'taxon' (plural 'taxa') is used to include all of these entities.

- Taxonomic groups that have not yet been assessed because of the difficulty of accessing expert advice (e.g. non-vascular plants) are expected to have high research needs.

The most common and urgent research needs that were identified were separated into 10 programmes for future work, as outlined in the table below (not in priority order).

RESEARCH PROGRAMME	SUMMARY OF RESEARCH ACTIONS NEEDED FOR THREATENED SPECIES MANAGEMENT
Determining the full range of biodiversity requiring management	Complete basic surveys to determine the current distribution and conservation status of Data Deficient and Data Poor taxa, and/or undertake taxonomic work for those with unresolved taxonomies.
Species on the brink of extinction	Integrate research into adaptive management experiments to develop and improve management methods, detection, and outcome monitoring for taxa predicted to become extinct in the near future.
Understanding causes of decline	Undertake targeted ecological studies to determine factors influencing productivity and survival.
Techniques for small populations	Develop techniques to sustain very small, vulnerable populations (e.g. translocations, genetic management, captive breeding, cultivation).
Detection and outcome monitoring	Design, test and calibrate methods for detection, inventory, and outcome monitoring.
Enabling the contribution of mātauranga Māori to species research and management	Test management approaches that use traditional knowledge and co-design to solve problems for threatened taxa where appropriate.
Pest impacts	Undertake targeted studies to understand which pests are the most important to focus on to recover threatened taxa and to develop effective new tools to control them using adaptive management.
Restoring natural processes	Undertake targeted studies to understand how to restore, improve, connect, or create habitat, and how to restore dependent biotic interactions and processes.
Human impacts	Undertake targeted studies to understand the impacts of vehicles, people, pets, stock, land development, fire, nutrients, and harvest, and develop techniques to mitigate these impacts.
Climate change impacts and adaptation	Predict and monitor the impacts of climate change and develop approaches to mitigate these impacts.

Conclusions

- This analysis has clearly demonstrated that considerable research is needed before effective management plans can be developed to secure numerous threatened taxa. It provides a strategic tool to inform research planning and determine the most important research *to do first*.
- Investing in the 10 research programmes outlined above will be essential to provide the knowledge required to effectively manage threatened taxa and to maintain the functioning of the ecosystems that they are integral components of.
- There is a strong need for conservation work to be carried out in a complementary way through partnerships and collaborations to increase capacity to do the core work and advance research to meet the goals of *Te Mana o te Taiao*. This includes partnerships with whānau, hapū, and iwi to incorporate mātauranga Māori (traditional knowledge) in threatened species work.
- The data from this analysis are provided as an open resource to help individuals and organisations align their research with the priorities identified here.