Fact sheet 5: Threatened species

Improved data and modelling to increase understanding of forest-dependent threatened species

Key points

- The 2017 VEAC *Conservation Values of State Forests Assessment* report identified 84 forest-dependent threatened species.
- Improved data and updated scientific modelling will increase our understanding of the distribution of habitat for high priority, forest-dependent threatened species.
- Landscape-scale surveys will update current knowledge of the distribution of high-priority forest-dependent threatened species impacted by timber harvesting, climate change, road construction, and fire management.
- Researchers will target 10 terrestrial fauna species for surveys in eastern Victoria, including Leadbeater's Possum, Long-footed Potoroo, gliders and owls, Glossy Black Cockatoo, Large Brown Tree Frog and Giant Burrowing Frog. In addition, surveys will target up to 15 threatened aquatic species (galaxias and crayfish) and 27 threatened plants to improve our understanding of their distribution and enhance their protection.
- Updates to Habitat Distribution Models will improve our understanding of the habitat suitability of the landscape for threatened forest-dependent Victorian species and predict the likelihood of suitable habitat in areas that have not been surveyed.
- Population viability analysis will be used to predict the effects of timber harvesting, bushfire, planned burning, climate change and other forest disturbances on animal populations now and into the future.

Research project titles

Landscape scale surveys

Updated habitat distribution models for key forest species

Population viability analysis with STEPs and metapopulation capacity for evaluation of future forest scenarios

Who is doing this work?

Arthur Rylah Institute (Department of Environment, Land, Water and Planning)

University of Melbourne

Assessing distribution of threatened species

Where animals and plants live depends on their environmental requirements and preferences, such as the location of food and shelter, the occurrence of other species they interact with such as predators, and how they can adapt as these factors vary. Some species may be restricted to one small location, while other species are more widespread.

Research is being conducted to better understand the distribution of forest-dependent threatened species, based on new on-ground research and the latest scientific modelling approaches.

Landscape-scale surveys will gather new field data to improve our understanding of the distribution of high priority, forest-dependent threatened species. Additional distributional data will be drawn from the Forest Protection Survey Program, which aims to detect threatened species in areas scheduled for timber harvesting. The detections will inform management decisions about protection measures and recently-collected data available from the Victorian Biodiversity Atlas.

These surveys will be used to refine a series of habitat distribution models. These models identify areas of suitable habitat for Victorian flora and fauna species based on observations of these species, known absences of species, and landscape characteristics such as climate, topography and soils.

The survey (or HDM's or both) information will also be used in population viability analysis modelling. This modelling uses the current and future location and extent of habitats suitable for threatened species to determine the viability of populations under various disturbance and climate scenarios.

Surveys and models

The 2017 VEAC *Conservation Values of State Forests Assessment* report identified 84 forest-dependent threatened species in Victoria, including frogs, fish, birds, reptiles, invertebrates, mammals, and plants.

Landscape-scale surveys

On-ground flora and fauna surveys will be focused in eastern Victoria, as this is where most timber harvesting occurs. Hundreds of sites will be surveyed, sampling in both State Forest and National Parks. Site selection will be based on what will most improve the habitat distribution models. For some species where the core habitat is well understood, survey sites may include areas outside the current known distribution, or in marginal habitats. Identifying where a species does not occur is as important for model development as knowing where the species does occur.

The researchers have developed a priority list of species on which to focus survey efforts, based on expert analysis of gaps in knowledge and where new data will make the most difference. It is not feasible to survey all threatened flora and fauna, so species were prioritised based on the relative understanding of the species, effectiveness of survey techniques, and gaps in knowledge. The project will target 52 flora and fauna species for surveys, including Leadbeater's Possum, Long-footed Potoroo, gliders and owls, Glossy Black Cockatoo, Large Brown Tree Frog and Giant Burrowing Frog, threatened freshwater fish and crayfish, and a selection of plant species. Researchers will also analyse data, collected during the landscape-scale surveys, to learn more about why species are distributed where they are.

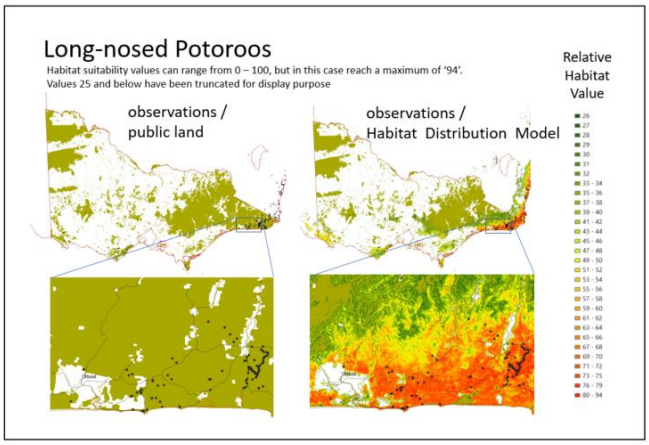
The researchers will use the most efficient survey technique for each species to ensure a high-level of reliability in the data collected. These include camera traps in trees and on the ground (for Leadbeater's Possum and Long-footed Potoroos), night-time spotlighting techniques (for Greater Glider, Yellow-bellied Glider, Powerful Owl, Sooty Owl, Masked Owl), identification of chewed remains of seed cones on the ground beneath Black Sheoak trees (for Glossy Black-Cockatoos, which leave characteristic feeding signs), nocturnal surveys, tadpole surveys and acoustic recorders (for frogs), aquatic surveys and electro-fishing (for fish), electro-fishing, hand searching and burrow tube traps (for crayfish), and targeted surveys of 1 hectare sites (for priority plant species). These survey methods have been extensively tested and for many species means we can be confident that the data collected reflect the presence or absence of a species. However, for some very cryptic species it is not possible to conclude that the species is absent if not detected, and so modelling will be based on presence records.

During the landscape scale surveys, all species (including other threatened and non-threatened species) that are detected will be recorded to increase our understanding of the suite of species that occur in these forests.

Habitat distribution models

Habitat distribution models (HDMs) will be updated for 77 species, including 10 high-priority species. HDMs will be improved using new field data collected in the Landscape scale surveys, the Forest Protection Survey Program and recently-collected data available from the Victorian Biodiversity Atlas.

HDMs have been developed for all rare or threatened Victorian species where sufficient data are available. The data that form the basis of these models have been collected since 1980, and include species records from interstate databases to increase model accuracy. HDMs use and compare this information on where a species has been recorded (and where it is unlikely to have been recorded), and relate these data to environmental variables, such as soil, prevailing climate, topography, and remotely-sensed spectral information. Researchers then use machine-learning processes to estimate the habitat suitability for a species across the landscape by averaging more than 1000 models per species. HDMs effectively interpolate the gaps between recorded observations of species, providing more nuanced information to inform management decisions than observations alone.



Survey observations and Habitat Distribution Model information for Long-nosed Potoroos, displaying the modelling of gaps between records to predict the distribution of likely habitat across the landscape.

HDMs cannot predict the direct presence of a species at a particular location; rather, they provide an indication of the likelihood of suitable habitat. The occurrence of a species at a particular location depends on factors such as the size of the habitat or past disturbances, which influences the age and structure of the forest. However, HDMs can answer questions about the likelihood of there being habitat for a species within an area, the most

important areas for providing habitat for a particular species, and areas of high biodiversity value.

Population viability analysis

Population viability analysis will assess the combined effects on animal populations of timber harvesting, bushfire, planned burning, climate change and other forest disturbances such as habitat fragmentation.

Researchers will develop spatially and temporally explicit population viability models (STEPs) for high-priority species. They will investigate the impacts, over at least 50 years, of various management and disturbance scenarios across Victoria.

The forest-dependent Greater Glider (Photo: Steve Smith, DELWP)

The research will improve our understanding of the prospects for the number, distribution and long-term viability of important forest-dependent threatened species. It will also improve our understanding of the relationship between the effects of forest harvesting and management, fire and other disturbances, and climate change on forest-dependent threatened species. This information can help support a more nuanced appreciation of the consequences of various management strategies and decisions for long-term persistence of species.

How will the research help manage our forests?

Landscape-scale surveys will improve our understanding of the distributions of threatened species' habitats to support a more strategic approach to managing forest values. The selection of priority species is designed to maximise the increase in new knowledge of key forest plants and animals. Improved survey information about where different species occur will support improved management of threatened species at a landscape scale and ensure that the modernised RFAs are based on the best available information.

The research will also improve the computer modelling of habitats and populations of species dependent on forests. The development of a series of revised HDMs that reflect the distribution of suitable habitat for high priority forest-dependent species will help inform land-use planning, conservation reserve management, invasive species management, and more.

Population viability analysis will assist managers to explore the effects of alternate forest management strategies on threatened species. It will improve predictions about the consequences of various forest management strategies on forest-dependent threatened species, and support decision-making about protecting forest-dependent threatened species.

More information

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https://www2.delwp.vic.gov.au/futureforests

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