Conservation of the Long-nosed Potoroo (*Potorous tridactylus*) in Victoria: Scope for the Deployment of Bioclimatic and Spatial Habitat Modelling

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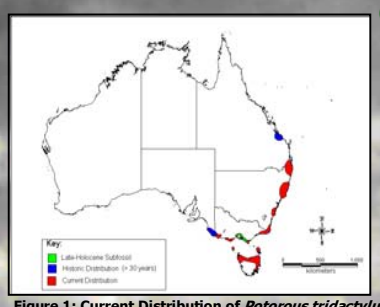


Figure 1: Current Distribution of ***Potorous tridactylus*** in Australia.

Abstract

The urgency to protect current populations of the long-nosed potoroo (*Potorous tridactylus tridactylus)* is clear, particularly due to its recent listing as an endangered species. Management options may demand the need for re-introduction, and so it is necessary to identify and protect areas of suitable habitat that could be used as possible release sites. The 675 sighting records for *P.t.tridactylus*, accumulated over the last century, held in the Atlas Of Victorian Wildlife database, were tested for error and 219 were accepted as input for bioclimatic modelling, using BIOCLIM. Using this modelling tool with spatial data integration, the bioclimatic envelope for *P.t.tridactylus* was mapped and habitat ranges with selected environmental thresholds were identified. Other studies have been based on the bioclimatic approach on environmental spatial layers. This study has combined both approaches to improve the prediction of suitable habitat. Three natural areas near Melbourne (Grantville Nature Conservation Reserve, Wonthaggi Heathlands and Green's Bush, Mornington Peninsula National Park) emerge as potential re-introduction sites for *P.t.tridactylus*, once fox control measures are successful. Clearly, and despite definite but solvable data quality problems, the data and information flow paths needed for spatial modelling of habitat for endangered species, can be framed and activated in Victoria. Such modelling can become a routine wildlife management tool, once the digital state spatial data infrastructure is extended to encompass the thematic data drawn upon for this study.

Figure 2: Distribution of ***Potorous tridactylus*** in Victoria.

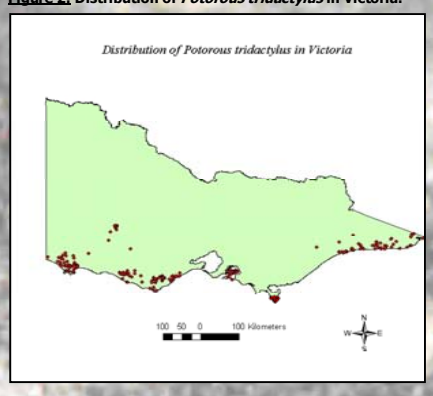
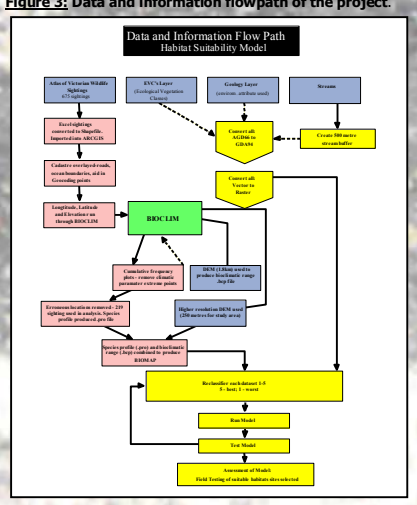


Figure 3: Data and information flowpath of the project.



Introduction

The Long-nosed Potoroo, *Potorous tridactylus*, is a medium-sized ground dwelling marsupial, similar in size to a small rabbit, and weighing between 660 – 1600g. It has a total body length (including head) of between 340 – 400mm and a tail length between 180 – 250 mm. *P. tridactylus* fur is brown-grey in colour with pale grey under parts. *P. tridactylus* differs from most other macropodids in that it is an omnivorous species, and, it digs for a substantial part of its food, because of its dependence upon underground fungi, hard-bodied arthropods, vascular plant tissues, seeds and fleshy fruits. *P. tridactylus* in Victoria utilizes a wide variety of open forest and scrub habitats, usually those developed on sandy loam soils in areas where annual rainfall exceeds 760mm. Population densities are often highest in wetter areas where the tree species are those favouring higher soil moisture e.g. *Eucalyptus ovata, E. viminalis* .

Methods

Refer to figure 3 for the steps undertaken for this project

Results

The results illustrate that much of the suitable habitat for *P.t.tridactylus*, based on the criteria assembled in this study, is contained within French Island where there is an established population of the species. Smaller zones of suitable habitat were also indicated: The model recognises a comparatively large area on the Bass Coast, small patches south of the Bass region, and patches occurring in the south of the Mornington Peninsula (See figure 5)

Discussion

The largest area identified by the model occurs within the Grantville Nature Conservation Reserve. The results of field-verification and information obtained by the reserve management authority (Parks Victoria), suggest that this site is suitable for *P.t.tridactylus* referring to vegetation structure, presence of a dense understorey, sandy soils and close proximity to streams and creeks The results of the modelling process also indicate an area south of Wonthaggi as being suitable for *P.t.tridactylus*. Some pixels produced by the suitability model occur on private land, whereas others fall within crownland. Field validation of the model revealed that this area is the Wonthaggi Heathlands Nature Conservation Reserve, and is managed by Parks Victoria. The general overstorey and understorey plant species and soil types present (typical of sand heathland and wet heathland) were identified in this area. This site is visually very similar to sites of known locations of *P.t.tridactylus* occurring on French Island. The habitat modelling process has identified areas occurring within Greens Bush; a part of Mornington Peninsula National Park (managed by Parks Victoria). The results of field validation illustrated the general overstorey and understorey species present. They are typical of a Heathy Woodland EVC classification. An area, characteristic of Sand Heathland, was also identified as suitable habitat.

The results of this study demonstrate that the success of environmental predictive modelling is reliant upon both data availability and data suitability. The approach used in this study would not have been possible even a few years ago, because the datasets used in the analysis were not then available. It can be argued that the datasets used were appropriate, in that potentially suitable habitat for *P.t.tridactylus* was predicted. However, as with any GIS study the output is only as good as the input data, so an understanding of data quality must be deployed.

Conclusions

The need to up-grade protection for current populations of the long-nosed potoroo *P.t.tridactylus* is now officially implied because of the recent addition of this species to the list of endangered marsupials. Because the habitat requirements for this potoroo are known, it is possible to use site selection mapping techniques to identify survey sites for testing present knowledge about current range, and also to identify suitable re-introduction/introduction sites. In this study I have exploited these possibilities using spatial modeling techniques. Digital bioclimatic analysis using meteorological data and DNRE Atlas data, yielded a valuable first approximation to the limits of the species distribution. The modelling approach was able to identify three sites of suitable habitat for *P.t.tridactylus*. The modelled status of the sites, was upheld by field validation. The three sites were: Grantville Nature Conservation Reserve, Wonthaggi Heathlands Reserve and Green's Bush, Mornington Peninsula National Park. The model validation exercise revealed that each site conformed to the criteria (derived from the siting record and bioclimatic analysis) set in that appropriate vegetation cover and species, dense understorey, sandy soils and close proximity to streams, were all present. Attempts to determine if *P.t.tridactylus* is present in the modelled areas using scat collection were unsuccessful. Direct testing methods including live trappings or hair-tubing analysis, would have to be carried out in these areas throughout an entire year, before one could to truly determine if the species is present in these areas that do not feature on the Atlas of Victorian Wildlife list of sites.

If management options demand a re-introduction program for this species, the approach utilized by this study can be implemented. Several additional information sets could be incorporated into such a model, including the spread of *Phytophthora cinnamoni*, distribution of foxes and dispersal of hypogeal fungi. Relevant soil data could supplement and strengthen the eventual database that could be used to support critical management decisions relative to saving *P.t.tridactylus* from extinction in Victoria.

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Figure 4: Results of Bioclimatic Analysis for ***Potorous tridactylus,*** using 250m DEM.

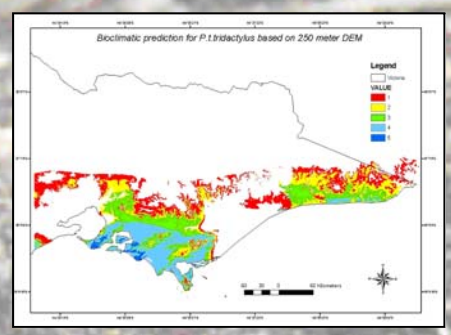

Figure 5: Results of the Habitat Suitability Output for ***P. tridactylus (after Boolean mathematical operation applied to combine bioclim, vegetation, geology and streams datasets).***