Australia's mammal fauna requires a strategic and enhanced network of predator-free havens

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Introduced cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) have caused the precipitous decline and extinction of many native mammal species in Australia[1]. Many surviving species now persist in the wild only on predator-free islands and in small natural refugia where introduced predators are at low density. These natural refugia have inspired the creation of "safe-havens": areas where populations of imperilled mammals can be protected from introduced predators, either on offshore islands, or by predator-proof fences on the mainland[2].

The creation of safe havens has revolutionised Australian mammal conservation in the late 20th century. The number of these havens has increased rapidly over the last 30 years (Figure 1); there are now 17 fenced areas (with a further 7 under construction) as well as 22 islands on which introduced predators have been eradicated and where population of native mammals have been translocated and established. Introduced predator eradications are currently planned for five more large Australian islands. These havens have improved the population status and likely prevented the extinction of some of Australia's most imperilled mammal species, mostly species of arid and semi-arid distribution, and larger body size. The network currently protects 38 mammal taxa regarded as highly or extremely susceptible to predation from introduced predators.

Most havens have been created by governments, non-government organisations, and private landholders acting largely independently of each other. Under a decentralised governance structure, and without an explicitly unified objective, new havens risk being established inefficiently, as seen in the early growth of protected area networks[3, 4]. For example, although the 11 havens created over the last seven years increased protection for 16 predator-susceptible taxa, these were already represented in the haven network and no unrepresented taxa were added to the network (Figure 1). Twenty-nine predator-susceptible taxa remain unrepresented in the haven network. If a primary conservation objective is to ensure comprehensive protection for all at-risk species, current expansion is performing poorly.

If national-scale objectives such as adequate representation of *all* predator-susceptible taxa in havens are to be met efficiently, new havens need to address representation gaps in the existing network. Systematic conservation prioritization methods[5] can help to identify the best locations for new havens, and inform strategies for determining the order in which taxa are added to the network. However, successful application of these tools requires conservation action be coordinated and communicated among the conservation actors who contribute to the haven network. This will be difficult to achieve because the actors are diverse, and employ different models to fund conservation actions[6]. Ultimately, the success of the haven network will be judged by its capacity to

sustain all predator-susceptible taxa until eradication of introduced predators at landscape or national scales becomes viable, allowing re-introduction outside of havens. This goal is achievable if decisions are informed by a coordinated national strategy supported by state-of-the-art conservation planning approaches.

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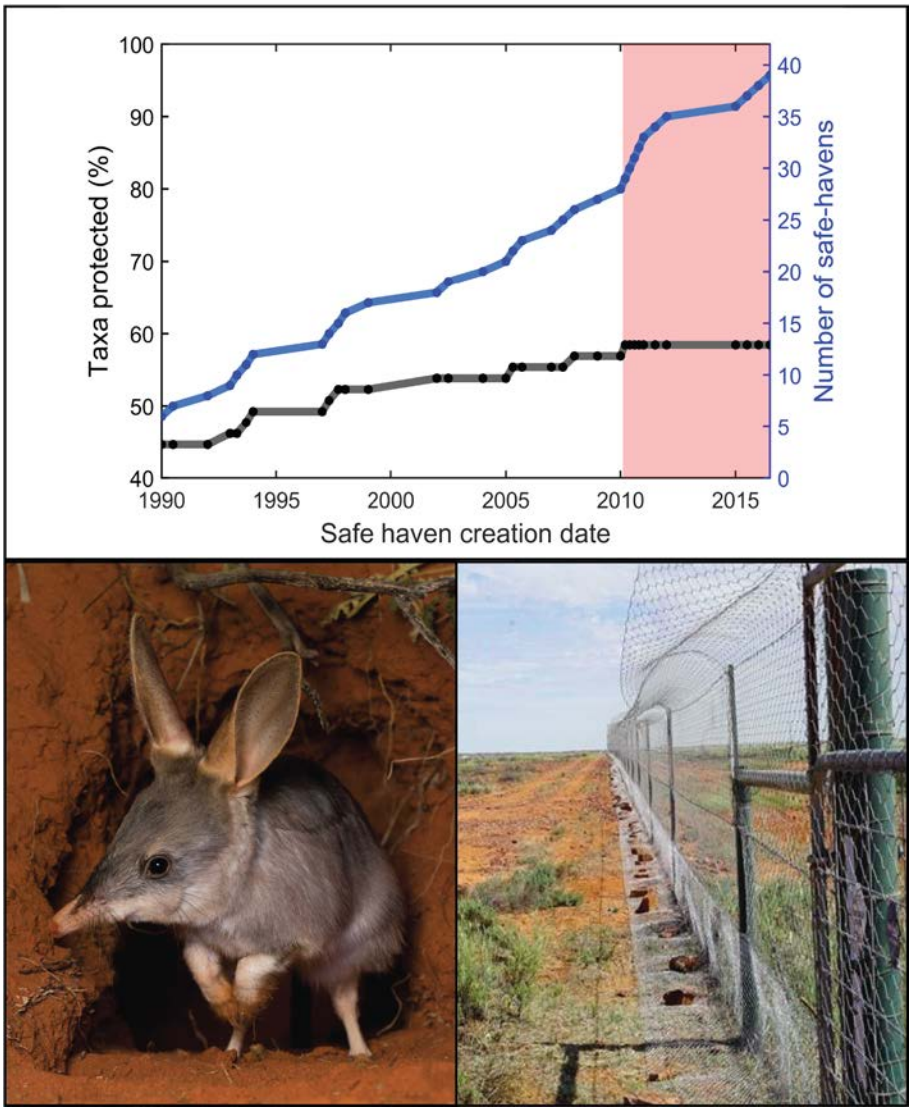

Figure 1

Top panel: Representation of predator-susceptible taxa in havens compared to growth in havens since 1990. ***Black line***, percentage of taxa protected by havens over time for a national target of 67 predator-susceptible taxa. ***Blue line***, number of safe havens over time. The ***pink band*** indicates the 11 havens created over the last 7 years, which have only provided coverage for previously represented species.

Bottom left panel: A greater bilby bettong (*Macrotis lagotis*) from Arid Recovery. Bilbies have been a primary focus for Australian havens (Photo credit Jasmine Vink and Arid Recovery).

Bottom right panel: The Arid Recover predator exclusion fence at Roxby downs. Fences like Arid Recovery protect some of the most vulnerable species from predation from introduced cats and foxes (Photo credit Arid Recovery).