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Small mammals digging engineer ecosystems

Small mammals digging for food play a vital role in ecosystems by enhancing soil fertility and condition, and helping to reduce bushfire risk, a new study has found.

University of Tasmania School of Natural Sciences' [Masters](#) student Gareth Davies worked with project lead Professor Chris Johnson and other researchers to measure the effects of digging by eastern bettongs, echidnas and other mammals on [soil](#) in temperate, dry forests in south-east Tasmania.

Tasmania is the only State or territory in Australia which has large populations of species such as eastern bettongs, bandicoots and long-nosed potoroos.

The eastern bettong is extinct on mainland Australia, and the populations of two species of bandicoots and the long-nosed potoroo are declining.

"The impact of small animals digging on forest floors, turning [soil](#) over and trapping organic matter, is vital in helping to create and maintain a diverse ecosystem," Professor Chris Johnson, from the University's School of Natural Sciences, said.

The study found the digging by bettongs and other species created pits that act as traps for organic matter. Soil that formed as a result of [breakdown](#) of organic matter in the pits had higher fertility and moisture content and lower hardness than undisturbed topsoil.

More generally, medium-sized mammals that dig for their food in the ecosystems of mainland Australia have declined dramatically since European settlement, the study stated.

"Our data [supports](#) the hypothesis that the loss of digging species has changed soil characteristics, reduced soil fertility and degraded ecosystem functioning over large areas of Australia," Professor Johnson said.

Key findings from the study include:

- the mammals dug foraging pits, which acted as traps for organic matter and sites for the formation of new soil which had higher fertility and moisture content and lower hardness than undisturbed topsoil;
- The traps, or patches, created habitats for invertebrates, which are vital for the regeneration of a forest's ecosystem;
- The digging of holes, which houses organic matter and moisture in the soil, helps to reduce bushfire risk.

"The animals digging create higher moisture content in the soil, which not only helps to reduce the risk of bushfire but also enables the habitat to bounce back quickly if it is affected by fire," Professor Johnson said.

"Digging mammals, such as the eastern bettong, provide a crucial element of ecological management and restoration of ecosystems."

Findings from the study, *Ecosystem engineering by digging mammals: effects on soil fertility and condition in Tasmanian temperate woodland*, was published today in Royal Society Open Science.

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