Social networking study reveals threat to Tasmanian devils

August 19 2009

Tasmanian devil. Image: by Mike Lehmann, Wikimedia Commons

A new study into the social networks of Tasmanian devils may help prevent the further spread of an extinction-threatening disease. The research, published in *Ecology Letters,* has produced an intricate social network of devil social relationships, revealing how disease can spread through a population.

The Tasmanian devil is the largest marsupial carnivore in existence, yet it is threatened with extinction from a unique infectious cancer known as devil facial tumour disease (DFTD). Devils are usually solitary animals, and the disease is thought to spread through biting when devils interact aggressively around prey carcasses and during mating season.

A Tasmanian-based team, led by Rodrigo Hamede from the University

of Tasmania, have used radio collars to discover the structure of the devil's contact network, providing an understanding of inter-devil encounters which have a profound effect on the transmission of the disease.

"Measuring individual contact patterns in wild animals is difficult, particularly for nocturnal forest-dwelling species," said Hamede. "However this information is critical for understanding animal sociality, disease dynamics and for building epidemiological models."

Previous studies of devil's social contacts have been limited to rare field observations during feeding, and since devils mate underground it has also been difficult to gather information on individual mating contacts.

The team attached proximity sensing radio collars to adult devils in Narawntapu National park, a 25-km^2 area containing a disease-free devil population. The collars were fitted to 46 sexually matured devils, 23 males and 23 females.

The collars logged when and for how long any two devils were in close proximity. The data was downloaded in the field whenever an animal was re-trapped and was used to measure association preferences and the frequency of inter-devil contacts.

"Understanding networks of contacts is crucial because it is usually the case that a small number of highly connected individuals, or 'super spreaders', are responsible for the majority of disease transmission," said Hamede. "Once these individuals are identified actions such as targeted treatment or culling may control the disease."

The resulting data revealed that despite devils being solitary animals all individuals were connected to a single social network meaning that all of the collared devils were connected to all other individuals. This reveals

how DFTD is able to spread easily across the entire population.

As predicted some individuals played a very active role within the network demonstrating the threat of 'super spreaders'. Also contact between female devils was seen to be more common than association between males, who appeared to make efforts to avoid each other.

While devils are thought of as promiscuous the data revealed preferred associations between male-female pairs representing males guarding the females, demonstrating a further threat of disease through prolonged contact.

"The first stage of disease transmission is the contact between susceptible and infected individuals," concludes Hamede. "The radio collars allowed is to measure the contacts that occur at this critical stage. The fact that all individuals are connected to a single network shows that the disease is capable of spreading to each individual in the population once one individual is infected."

Source: Wiley (news : web)