



Prize Winner

Science Writing

Year 3-5

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The Devil You Don't Know

Species Variation! The Science of Biodiversity

Angry, snarly and hungry - Taz, the Tasmanian devil is a beloved Looney Tunes character which is based on the real-life Tasmanian devil. The plucky character is a favourite amongst children and has raised the profile of the species around the world.



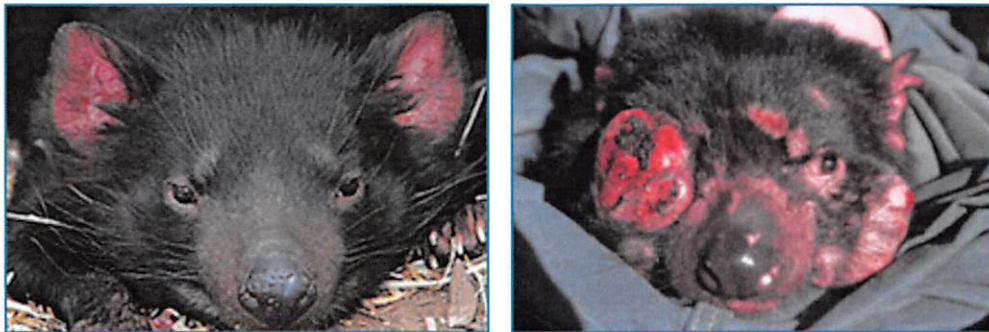
Image 1 - Taz

The true Tasmanian devil is endemic to Tasmania. It is an iconic Australian animal which has been used globally to promote tourism, and images of the popular animal have been used in logos and symbols of many clubs and associations. In the last 20 years however, up to 90% of the devil population has been lost to the fatal disease, Devil Facial Tumour Disease (DFTD), a transmissible cancer that only affects Tasmanian devils. There is no vaccine and no cure and there are dire predictions that the devils could become extinct in the wild. Sadly, in the future children may only ever see this animal in captivity, in history books or in Looney Tunes cartoons.

This article looks at species variation in saving the devil, and why it has an important place in the biodiversity of the Tasmanian wildlife.

Deadly cancer leads to devil decline

DFTD is a transmissible cancer that only affects the Tasmanian devil. The cancer is transferred when diseased devils bite healthy devils. When the animal is infected with DFTD, large tumours develop around its mouth and neck making it impossible for the devil to eat. The animal eventually dies of starvation within six months of being infected.



A healthy Tasmanian devil (left) and a devil afflicted with DFTD (right).

Image 2

Since its discovery 20 years ago, DFTD has led to the decline of the species by up to 90% in some areas. The Tasmanian state government estimates that the number of devils has dropped from around 250,000 in the mid 1990s to 25,000 in 2015. In 2008 the species was declared to be endangered and is wholly protected.

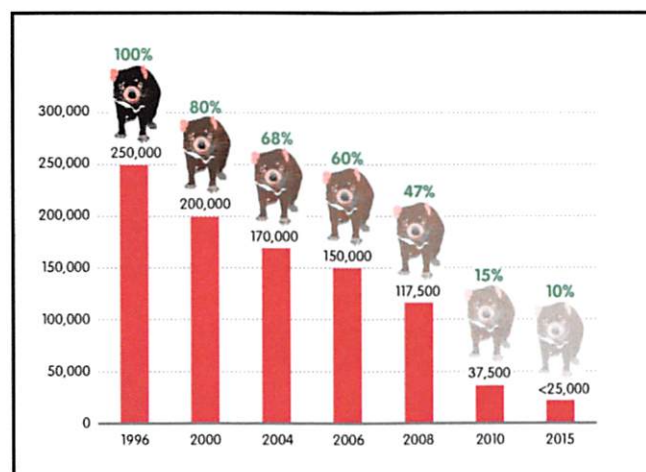


Image 3 - Devil population

Species variation and the Tasmanian devil

Species variation can be defined as all the differences which exist between members of the same species “caused either by genetic differences or the effect of environmental factors on the expression of the genetic potentials.” (www.britannica.com)

Scientists believe that the reason for the rapid spread of the cancer amongst devils is because they suffer from a lack of genetic variation as a species - “The species lacks significant variation in a key immune gene region, known as the major histocompatibility complex”(Furlan,E). This means there isn't much variation in their immune systems and they are limited in their ability to fight off the virus.

Scientists state a few reasons for this lack of genetic variation;

Species isolation

When sea levels rose 12,000 years ago, a small number of devils in Tasmania were cut off from the mainland population. The devils in the mainland became extinct. The surviving devils in Tasmania did not have as

many gene variations as the larger population, resulting in a decline in genetic variation. Though the population of the devils in Tasmania grew over time, they were stuck with a low level of genetic variation and low immunity.

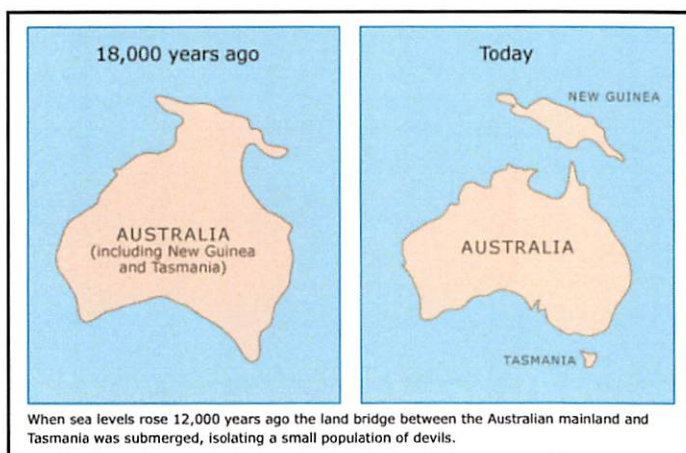


Image 4 - Rise of sea level separating Tasmania from mainland

Climate change

Researchers found that an ice age 20,000 years ago and a climate change event 5,000 years ago led to an arid climate making it difficult for devils to find food and shelter. This reduced the devil population by up to 80%. The species continued to survive through this period but the genetic diversity was reduced.

Human activity

The early settlers mistakenly believed that the devils were a threat to their livestock. They were hunted for over 100 years until the species was given protection status in 1941. In more recent times, land clearing and roadkill are the biggest dangers caused by human activity.

Tasmanian devils and the biodiversity of the Tasmanian wildlife

Biodiversity is defined as “the variability among living things; the different plants, animals and micro organisms, the genetic information they contain and the ecosystems them form”(www.australianmuseum.net.au).

Ray Nias of WWF Australia’s conservation program explained that the devils play an important role in the biodiversity of the Tasmanian wildlife. “If the devils go, and the foxes and cats increase, it would be all over for a good dozen or more species of mammals - many of which are unique to Tasmania.....not to mention lizards and ground-dwelling birds.”

The biodiversity book by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) describes 5 core values that humans place on biodiversity - Economic, Ecological life support, Recreation, Cultural and Scientific. This is explored below with reference to the role of the devil in the Tasmanian wildlife;

1. Economic

The devils are regarded as the vacuums of the forest as they seek out and eat sick and dead animals. They keep the bush healthy by reducing maggots which can lead to fly strike in sheep. The devils help farmers livelihoods and indirectly support the health of farm animals for human consumption.



Tasmanian Devil eating a wallaby

Image 5



Image 6 - Eastern quoll

2. Ecological life support

Devils are the apex predators of the Tasmanian bush. They have prevented the numbers of alien pests such as feral cats and the red fox from getting out of control. They help protect our native species such as the brush-tailed bettongs, eastern quolls, spotted-tail quolls and the eastern-bred bandicoot.

3. Recreation

The Tasmanian devil is the world's largest surviving carnivorous marsupial and can only be found in the wild in Tasmania. Many people are curious to see the natural wonders of Tasmania. Activities such as bushwalking depend on its unique biodiversity.



Image 7 - Bushwalking in Tasmania



Image 8 - Dot painting of Tasmanian devil

4. Cultural

Indigenous culture has strong connections with the spiritual beliefs about animals and plants. There are many names in Aboriginal languages to describe the Tasmanian devil - tarrabah, poirinnah and purinina.

5. Scientific

Observing and collecting information on the behaviour of the devil will help scientists to understand threats to the species and ways to protect them.



Image 9 - Scientific research

Saving the devil

The 'Save the Tasmanian Devil Program' was established in 2005 to reduce the impact of the disease. One of the aims of the program was to bring together DFTD-free genetically diverse devils into a secure managed area and breed them. The aim is to release the offspring with new combinations of genetic diversity back into the wild. Other parts of the program involve moving some devils to DFTD free areas to grow a new disease-free population.

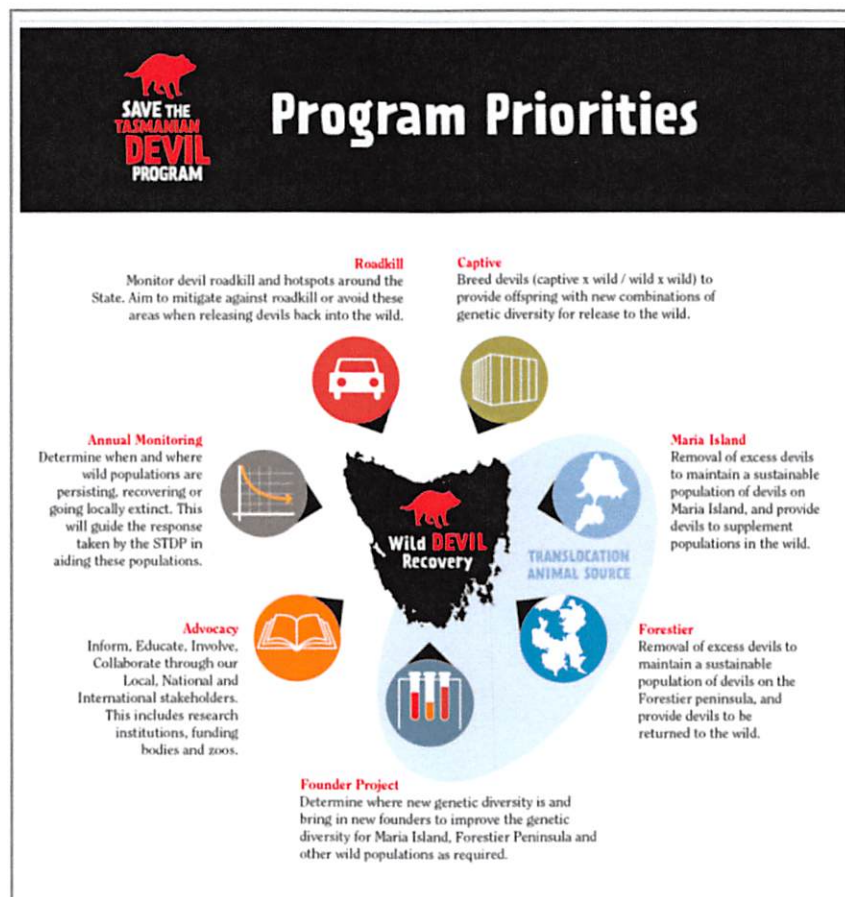


Image 10 - Save the devil program priorities

Conclusion

The limited genetic variation in the Tasmanian devil caused DFTD to spread quickly. The devil plays an important role in nature and the decline or loss of the species in the wild will have important consequences for the ecosystem.

Variation within a species is a critical aspect of biodiversity. "It's not just the loss of whole species that we should be concerned about. We also need to pay more attention to the ecological consequences of variation within species" (Stephens, T).



Image 11 - Taz ♡



Image 12 - Baby devil, A New Hope

References

- Eaton, Maddie - Endangered Species: The Tasmanian Devil, <https://medium.com>, 10/7/2017
- Evolution down under, <https://evolution.berkeley.edu>, September 2008
- Furlan, Elise - Variation is the genetic key to survival, www.theage.com.au/education, 25/2/2008
- Hansford, Dave - Tasmanian devils named endangered species, www.nationalgeographic.com/news, 21/5/2008
- Hernandez, Daniela - Low genetic diversity may be Tasmanian devils' bane, Los Angeles Times, www.articles.latimes.com, 2/7/2011
- Parks and wildlife service, Tasmania, www.parks.tas.gov.au
- Save the Tasmanian Devil Program, www.dpipwe.tas.gov.au
- Shine, Tyson - Tasmanian devils' low genetic diversity, extinction risks date back to ice age, www.mobile.abc.net.au/news, 5/11/2014
- Stephens, Tim - Study finds variation within species is a critical aspect of biodiversity, www.news.ucsc.edu/2017/12/species-variation.html, 5/2/17
- Street, Andrew - Faced with extinction, the devils fight back, www.cosmosmagazine.com/biology
- Tasmanian devil, www.wikipedia.org
- University of Tasmania - Devil decline leads to significant ecosystem changes, www.utas.edu.au
- Zwankhuisen, Maurits - Native animals should be rechristened with their aboriginal names, www.australiangeographic.com.au, 15/8/2017
- www.britannica.com

Image 1 - Google images, www.google.com.au

Image 2 - www.evolution.berkeley.edu

Image 3 - Eaton, M

Image 4 - www.evolution.berkeley.edu

Image 5 - Watts, D, www.photoshot.com

Image 6 - Watts, D, www.photoshot.com

Image 7 - www.tourismtasmania.com.au

Image 8 - Google images, www.google.com.au

Image 9 - www.dpipwe.tas.gov.au

Image 10 - www.dpipwe.tas.gov.au

Image 11 - Google images, www.google.com.au

Image 12 - Google images, www.google.com.au

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Pages App for iPad - the Apple App I used to put the article together