SOUTHERN CASSOWARY

KEYSTONE SPECIES

STAGE ONE BIOLOGY | EXEMPLAR

Introduction

A keystone species is a species which has a disproportionate effect on its ecosystem. The southern cassowary, *Casuarius casuarius*, is considered a keystone species within its habitat of tropical northern Queensland rainforest – having a great impact on its health and biodiversity. However, the positive work of the southern cassowary has been negatively affected by human impact mainly in the forms of habitat destruction and road fatalities. The protection of the southern cassowary has been made difficult due to its shy nature and thus, the lack of data collected concerning the large, flightless bird. However, increasing data is being gathered thanks to **developments in science and technology** which have aided research methods for **improving** the outlooks for protecting this species.

Human Impact

The southern cassowary has a large impact on the rainforests of northern Queensland. Its preferred food source is the fleshy fruits of rainforest flora. Majority of these fruits have seeds too large for organisms other than the cassowary to digest. The seeds of these fruits are passed through the digestive system unharmed and are deposited in a build-up of faeces. The faeces act as fertilizer, allowing rapid germination for the seeds and thus helping distribute new growth and aid the biodiversity within the rainforest (Bird Life 2017). It is responsible for transporting the seeds of more than 60 plants species throughout the Cape York Peninsula, Queensland (Australian Geographic 2014), and as a result is considered a keystone species for this ecosystem. If it were to become extinct, or greatly diminished, the rainforests of northern Queensland would suffer a decline in biodiversity, as plants that depend on the cassowary for dispersion will die off. This would in turn effect other fauna within the community and ecosystem by reducing food sources on all levels of the food web. Consequently, the southern cassowary is a definite keystone species (Cassowary Recovery Team 2017).

The southern cassowary is considered endangered (Sabhel 2016) as a 2001 census suggests there are fewer than 1500 left. This number has dropped from 2500-4000 breeding adults in 1988 (Australian Geographic 2014). This drop in numbers is due to human impacts on its population. These major threats include habitat loss, degradation and fragmentation; road and vehicle strikes as well as direct human interaction (Cassowary Recovery Team 2007).

Habitat degradation and loss is a major threat for the southern cassowary as it has small range within Australia and northern Queensland. By 1997, 81 per cent of the native vegetation had been cleared. Since then, clearing rates have slowed from 3000ha to 1000ha per year (Cassowary Recovery Team 2007). Further studies show

that 80 per cent of the cassowaries' prime habitat, coastal lowland rainforest, has been cleared over the last 100 years (Australian Rainforest Foundation 2017). Land clearing is a result of human population increase and thus a need for housing developments. This clearing has also resulted in habitat degradation and fragmentation which has been proven to disrupt the movement patterns of cassowary within the area as well as segregate feeding and breeding areas, leading to genetic isolation and local extinctions (Fryburger 2017).

Road and vehicle strikes also negatively affected the southern cassowary (Sabhel 2016). As humans have developed the land to suit their purposes, they have constructed a total of 3777km of roads, highways and tracks which pass through the its key habitat. Further studies detail that 104 southern cassowary deaths between 1992 and January 2014 were a direct result of vehicle strikes (Salleh 2016). Considering the cassowary is slow to reproduce, and has low juvenile survival, the death of one cassowary may have a large impact on the reproductive fitness of surrounding cassowary populations (Bird Life 2017).

Solutions

Despite the challenges facing the cassowary, **developments in science and technology** have helped improve research methods regarding the southern cassowary. One of the most recent is **the development of the technology** for DNA testing which is greatly improving research efforts to track individual cassowaries as well as whole populations using DNA their faeces (Cassowary Recover Team 2015). In a world first, CSIRO scientists have been using **innovative DNA techniques** to gather and analyse reliable data about cassowary populations. Developments in the sophistication and speed of DNA analysis has been allowing for identification of individual animals, family groups and the ranges of habitat they use (CSIRO 2017). Dr. David Westcott from CSIRO explains how important this development is for conservation efforts: 'Combining the DNA results… will give us **new clues** about the birds and we will be able to create **a new model** of how cassowaries use habitats and how their populations work' (CSIRO 2017). This new approach will go a long way to help protect this keystone species from human impact.

As the government and organizations such as the Cassowary Recovery Team, Mission Beach Cassowaries and Kuranda Conservation gather new population information, they have started to **employ new approaches that make use of smart phone and social media technology** (City of Mission Beach Council 2017). Development of smart phone apps that can report GPS locations in real time of sightings of the birds have been making **measurable improvements** in our understanding of how populations are moving and how close they are to human infrastructure like roads. Sittings are monitored, collected and analyzed in a way

that was impossible before harnessing technology in smart phone and social media platforms (Wet Tropics 2017). Scientists can respond to sightings, and this has already led decrease in fatalities along some roads.

A big focus of several organizations is the education of northern Queensland communities **using these developments in technology**, particularly Indigenous Australian communities, concerning the conservation of the southern cassowary and its importance for ecosystem biodiversity. This is achieved using social media, websites and catch phrases such as "be Cass-O-Wary" (Wet Tropics 2017).

New technology developments in special mapping software have recently been used by protection agencies to create better cassowary corridors. Corridors are stretches of land which aid the bird's through northern Queensland, preventing them from encountering human civilization (Fryburger 2017). The use of this analytical mapping software to create safter corridors is already dropping the level of cassowary mortalities by 10% in the last 5 years and reducing or countering the number of fragmented habitats, says lead **technology developer** Kieth Cowell from the ENSFaR mapping (Sabhel 2016).

Conclusion

Perhaps the solution which will be most effective solution is the use and further development of **DNA testing technology**. This method, with its continual development in technology gives conservation efforts the clearest and most reliable data in order to assess and plan for future protection of the species. Without this solid scientific approach, the creation of corridors and the use of input from social media and smart phone technology, as helpful as they are proving to be, will still be only limited in its reach. Having ongoing data from DNA is essential to providing deeper insights into population change, health and movements. These are key to the creation of long term and scientifically grounded conservation efforts that provide historical data to work with and make quantifiable decisions on.

Throughout this report, it has been illustrated that certain **key developments in science and technology** are aiding the research, protection and, ultimately, long-term conservation of the southern cassowary. This has been particularly emphasized through the example of DNA testing which has been used to monitor and protect the cassowary populations in northern Queensland.

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