

## Submission to Senate enquiry into the impacts of feral deer, pigs and goats in Australia

### 1. Introduction

This submission addresses the impacts by feral Fallow Deer on the biodiversity values of the Waite Conservation Reserve, an important woodland remnant in the foothills of the Mt Lofty Ranges near Adelaide. In particular it highlights the poorly understood and under-reported role that deer play in dispersing weeds in Australia.

### 2. Waite Conservation Reserve

Waite Conservation Reserve comprises 121-hectares of Grey Box *Eucalyptus microcarpa* Grassy Woodland, a Nationally endangered plant community. Though somewhat degraded by past grazing and weed invasion, the reserve has responded well to 25 years of ecological restoration by the University of Adelaide and Friends of Waite Conservation Reserve. In particular, a vast effort has been expended controlling feral olives *Olea europaea* which previously occupied more than 90 percent of the reserve. Feral olives are a major problem in areas of southern Australia with a Mediterranean environment and especially in the Adelaide Hills where they have been present for 180 years.

### 3. Feral Fallow deer

Feral Fallow deer *Dama dama* occur in variable numbers throughout agricultural South Australia wherever there is remnant vegetation to provide cover. This includes the Mt Lofty Ranges. Small numbers of deer are resident or transient visitors to the reserve despite ongoing but infrequent culling by experienced hunters. Shooting is hampered by the need to close the popular public reserve and by the imposition of strict protocols on where deer may be safely culled. Typically, there will be 5-15 deer utilising the reserve at any time.

### 4. Deer impacts

#### 4.1 Damage to vegetation

Deer kill or severely damage many sapling trees and shrubs either planted or which have regenerated naturally in the reserve. They are particularly severe on saplings of Drooping Sheoak *Allocasuarina verticillata*, Native Cherry *Exocarpos cupressiformis*, Golden Wattle *Acacia pycnantha* and Sticky Hopbush *Dodonaea viscosa*. Most damage is caused by ongoing rubbing or thrashing which ultimately kills plants by ring-barking. As well deer cut many new trails through the reserve with their sharp hooves.

#### 4.2 Weed Dispersal

The most serious impact however is the scale at which deer disperse olive and other woody weed seeds into areas where these weeds have been effectively removed. While some seeds are also dispersed by foxes and by birds, it is clear that deer are by far the worst culprit.

It is perhaps not widely known that Fallow deer eat large numbers of olive fruit then later regurgitate (rather than defecate) the cleaned olive pits in scattered piles wherever they feed and rest. Relieved of the inhibitors contained in the outer flesh, the pits are pre-treated ready for germination. Pits so treated are far more likely to germinate than fruits that fall from the tree intact and are subject to germination inhibitors and to allelopathic effects from the parent tree.

In a small study in 2017 the Friends of Waite Conservation reserve with University of Adelaide Vertebrate Pests Management students surveyed deer-mediated olive pit (seed) dispersal in part of the reserve. The study found the equivalent of 176 deposits/hectare each containing a mean 480 pits equivalent to a staggering 85,000 olive pits/hectare.

Importantly, counts were conducted in areas cleared of mature olives at least 15 years earlier and where the natural seed bank was deemed to be exhausted. The large number of seeds per deposit also ruled out either foxes or birds as the dispersing agent. Clearly all seeds were transported there by deer from some distance away. The age of pits varied, indicating an accumulation over several years. In 14 percent of cases the pits were split in halves suggesting past germination.

About half the deposits were associated with small shallow craters dug by deer. Male Fallow deer dig large craters at rutting (mating) sites and the many smaller craters may be 'practice' sites made outside the rut, by subordinate males, or by females. The deer typically regurgitated olive pits into the excavated tilth on the margins of each crater. Many pits were buried in the tilth by subsequent excavating by deer. Following rain, the craters fill with water, irrigating any seedlings which germinate. In some cases, the deer also defecate on the sites. The deer thus are engaged in the harvest, pre-treatment, transport, sowing, irrigation and fertilisation of the seeds and developing seedlings. By any measure the deer are practising olive horticulture!

#### 5. Implications for management

The above demonstrates that even few deer can have a disproportionately severe impact on our natural systems. The Friends group spends several hundred hours each year systematically walking the reserve locating and removing tens of thousands of olive seedlings as well as lesser numbers of Hawthorn *Crataegus monogyna*, Blowflybush *Rhamnus alaternus*, Boneseed *Chrysanthemoides monilifera* and other weeds dispersed by deer. The considerable effort required to constantly remove these woody weed seedlings

comes at the expense of time and opportunity costs for more productive restoration activities.

Deer numbers over the past few years have been kept low by occasional shooting. Without this culling there is little doubt that deer numbers would be higher and damage more severe. There is a risk that culling will become increasingly problematic and politically unpalatable especially in what is a peri-urban area. Other techniques must be developed that humanely and effectively reduce deer numbers to minimise the damage they cause.

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