Michael Grant
Co-ordinator Heritage & Conservation Services
Monash City Council
Michael.grant@monash.vic.gov.au
(03) 9518 3727

10th October 2022

Assessment of Ecological Impacts from Domestic Animals and Invasive Pests within Damper Creek Conservation Reserve, Mount Waverley

Practical Ecology was commissioned by Monash City Council to highlight the impacts domestic animals and invasive pest animals have on the native flora and fauna values throughout Monash's bushlands reserves with particular focus on Damper Creek Conservation Reserve.

Damper Creek Conservation Reserve (DCCR) is approximately 13.2ha, located in Mount Waverley, 20km east of Melbourne. The Conservation Reserve runs either side of Damper Creek and contains significant remnant flora values which provide an important ecological corridor in an otherwise urbanised municipality. The remnant vegetation within the reserve was assessed as having high quality biodiversity values and moderate biodiversity values for the remainder of the reserve based on the mature revegetation and floral diversity present (McKinnon 2022).

The revegetation of terrestrial and wetland/riparian plantings, low weed cover and high recruitment of indigenous flora species within the reserve clearly demonstrates the successful management that has occurred, resulting in high biodiversity values throughout the DCCR. With this, management efforts are now focused more on increasing and maintaining the flora and fauna values that are currently present, which can be done through the management of key threats currently present within the Reserve. One of the further management recommendations stated in the *Damper Creek Conservation Reserve Conservation Management Plan* (McKinnon 2022) was to reduce the impact of domestic dogs throughout the reserve through implementing restrictions.

DCCR is currently an 'off-leash' reserve, where dogs have unrestricted access throughout the entire area. It is understood that Monash City Council (MCC) are considering altering the current 'off-leash' status to 'on-leash' within DCCR to support the restoration and enhancement works to date. MCC are seeking to further understand and highlight the impacts domestic animals and invasive pest animals can have on flora and fauna values when access is unrestricted.

This document aims to highlight the most common domestic animals and invasive pests of the area that have detrimental effects on native flora and fauna values, and provide strategies and recommendations that can be implemented to reduce the amount of harm done to the native environment.

1. DOMESTIC ANIMALS

Due to DCCR being within an urbanised environment, domestic animals, particularly dogs are one of the most common introduced animals to pass through the reserve. Domestic animals can be disruptive to native ecosystems if unrestricted and can cause damage to flora and fauna values that are present. This section aims to highlight impacts that the two most common domestic animals (dogs and cats) have on native flora and fauna.

1.1. Dogs

Effects on Native Fauna

Dogs are natural predators and search for items of interest through their strong sense of smell and hearing, allowing them to identify if an animal is nearby before the prey is seen. The physical presence of a dog alone can impact native fauna through inducing stress. Stress influences fauna in many different ways. For example, when under stress, birds corticosterone levels dramatically increase leading to excessive weight loss (Angelier et. al. 2016). Birds also have the tendency to self-mutilate when stressed as well as increase vocality and have increased risks of developing diseases such as Aspergillosis (Robertson 2019). This compared to Brushtail Possums which when stressed can develop stress dermatitis which causes painful skin rashes resulting in fur loss and infection which can be deadly for the individual (RSPCA 2020) Vulnerable fauna are likely to leave an area if a predator's scent such as a dog is frequently detected within the species habitat (Banks, et al. 2007). Additionally, it has been observed that feral predators such as foxes, are not deterred by the scent of dogs and will still hunt/scavenge in areas where dogs frequent (Mitchell 2005).

Domestic dogs have the potential to injure or kill native fauna if unrestricted within natural environments. Even the most well-mannered dog, off lead can attack or kill native fauna. Invertebrates are known to be the most commonly consumed group of species by dogs, followed by mammals, birds and then reptiles (de Campos et. al. 2007). Dogs can carry diseases such as mange which can be transferred to native fauna. When left untreated can cause animals to lose fur, have weaker immune systems and cause starvation. Dog faeces and urine create excess nutrients in the environment such as nitrogen and phosphorus, these nutrients (and faeces) can enter waterways creating pollution and nutrient blooms as well as reducing or excluding flora species that certain fauna species rely upon. This can cause species, in particular sensitive fauna to leave habitat areas in search for more favourable conditions or worst case the environmental conditions present cause fatality (Holderness-Roddam 2011).

Effects on Native Flora

Dogs negatively impact flora values present in reserves or bushland areas in a variety of ways. Dogs can reduce revegetation efforts through the destruction of plantings by trampling, digging and/or eating sensitive vegetation. Faeces can also impact revegetation through introducing excess nutrients into the soil which can result in plant death or by introducing the seed of exotic weed species,

increasing competition for plantings (Buchhilz et al. 2021). See dispersal through faeces not only impacts plantings or sensitive vegetation but all indigenous flora species due to the fast growth rate of exotic species and in turn can introduce weeds species into an area not previously colonised or once eradicated through management efforts. Dogs are a vector for weed propagules to spread, with exotic seed getting stuck within dog fur as well as faeces (Holderness-Roddam 2011). As discussed above, faeces introduce excess nutrients into the environment and have the potential to pollute waterways, creating excess nutrients and reducing the growth/presence of riparian and/or wetland flora species.

Relevance to Damper Creek Conservation Reserve

Dogs currently have unrestricted access to all areas within Damper Creek Conservation Reserve when 'off leash'. Given this unrestricted access, all of the negative impacts associated with domestic dogs stated above are likely to occur within the conservation reserve, in particular within the remnant and revegetation areas. It is difficult to determine the rate of impact that each dog may have within a natural environment, however given the history of dog presence within DCR it is likely that such impacts are present. Increases in disturbance within remnant or revegetated areas likely results in more works needing to be conducted to restore/maintain the Reserves' native biodiversity.

1.2. Cats

Effects on Native Fauna

Cats are opportunistic predators that will hunt and kill birds, small mammals, amphibians, reptiles and invertebrates. Cats have the ability to climb into trees and access tight areas where native fauna may be sheltering. Cats can be classified into four different categories that affects the impact the species may have on an environment. These categories include Owned, Semi-Owned, Unowned and Feral. Owned cats make up the largest group within Australia with approximately 4.9 million individuals. Semi-owned and unowned cats include cats that are lost or abandoned, with this group estimated at roughly 710,000 individuals. Finally, feral cats are cats that live independently from humans and require little to no contact from humans for survival. The population of this group is estimated to be 2.07 million individuals. The latter two groups are expected to kill more wildlife as this is their only food source however, owned cats will still hunt for prey despite being well fed (AVA 2022).

It has been estimated that cats kill roughly 2 billion native animals every year, with a further billion invertebrates killed every year (NESP 2020). From this it is estimated that every day cats kill roughly 3.2 million native mammals, 1.2 million native birds 1.9 million reptiles and 250,000 native frogs (NESP 2020). Even well-fed cats still hunt for prey and will kill if given the chance (Coman & Brunner 1972). It has been shown that only a fraction of all prey hunted by cats is brought back to the home meaning that fauna mortality rates may be much higher than commonly thought (Loyd et. al. 2013) It is clear from these findings that cats have a significant negative impact on native fauna.

Additionally, cats, similar to dog's cause stress to native animals through their presence and scent within native fauna habitat (Trouwborst et. al. 2020).

Effects on Native Flora

Cats' main detrimental effects of flora is the predation of pollinator species that plants rely on (Medina et. al. 2011). Local extinctions of pollinators can cause plant communities to crash due to the lack of pollination occurring in the area. Cats also effect flora through the spread of weed propagules through scats and fur dispersal. Seeds that pass through the digestive system of cats or get trapped in their fur can spread into bushland areas and germinate (van der Meulen et. al. 2008). Faeces will spread an increased amount of nutrients into the soil and waterways increasing the rate and spread of weed species and water pollution within an area (Holderness-Roddam 2011).

Relevance to Damper Creek Conservation Reserve

Currently the population of cats that utilize DCCR for hunting/roaming is unknown however, from VBA searches 3 separate recordings of feral domestic cats were found in a 5km radius around DCCR. It can be assumed that some cats would be present in the area both feral/stray and pets from neighbouring properties. Cats that are allowed to roam free around the neighbourhood would contribute to the loss of fauna commonly associated with cats. This would result in the loss of vertebrate and invertebrate pollinator species which could cause a loss of plant life and plant germination within DCCR.

2. INVASIVE PESTS

2.1. Foxes

Effects on Native Fauna

Foxes are extreme hunters that are nocturnal and territorial that hunt for prey as well as scavenge for food. They are able to kill more prey than they can eat which is knows as surplus killing behaviour (NSW DPE 2021). Foxes are so successful in urban environments as they do not require large areas of bushland for shelter. They have no natural predators and are highly adaptable to changing environments. Foxes cause significant losses to native fauna through excessive predation, where they mainly target small mammals and ground birds but have also been observed killing reptiles, amphibians and invertebrates (Coman 1973). Foxes have been so successful in Australia as the native fauna have not adapted to being hunted by foxes and are therefore, easy targets for hunting. Foxes face no natural predators in Australia allowing their populations to rise without any significant barriers, causing many extinctions and local extinctions of native fauna (Queensland Govt. 2020). Foxes also carry a range of diseases such as mange and distemper that can be transmitted to other species such as dogs, possums and wombats, causing decline and sickness in populations (DSEWPC 2010).

Effects on Native Flora

Foxes spread weed propagules from faeces and physical transmission. Foxes have a wide range in diet, and also commonly eat fruits and berries (e.g. Blackberries, Boxthorn, Sweet Briar). These seeds are mainly distributed after an animal has consumed the berry and the seed passes through their faeces. It has been found that berry seed germination rates through fox scats are between 22-35% (DELWP 2017). Fox scats also contain excess nutrients that leech into soil and can cause weed growth. For shelter foxes create dens by finding burrows, tree hollows or through digging into the ground. The soil disturbance that occurs through den construction increases the germination and spread of weed species by daylighting seeds that may have been previously unable to germinate due to dormancy.

Relevance to Damper Creek Conservation Reserve

VBA records indicate that there have been 19 separate recordings of Red Foxes within a 5km radius of DCCR, with the last record being observed in 2017. This indicates that foxes are in the area of DCCR and may occasionally enter the Reserve or are potentially living in the Reserve. Foxes within the reserve will result in high native fauna mortality and the reduction of native fauna populations. Animals such as small birds, possums and frogs are at significant risk from foxes within DCCR.

2.2. Common Myna

Effects on Native Fauna

Common Mynas are extremely territorial birds that exists within small to large community structures which commonly bully native species out of an area they inhabit. They are known to outcompete native and endangered bird species out of nests and hollows resulting in a decline in native species presence. Common Mynas actively eat and destroy the eggs of other bird species killing any chicks that may emerge. Furthermore, Common Mynas spread disease and parasites to other birds resulting in a sick native population (DPIRD 2021).

Effects on Native Flora

Common Mynas spread weed propagules through faeces and are commonly associated with spreading common olive species and other fruiting plants. Spreading of weed propagules results in fewer native species being able to germinate, thus lowering the quality of native environments (DPIRD 2021). Common Mynas also have the ability to outcompete native fauna for food resources. Due to the large community structure of Common Mynas, the feeding habits they have on the environment can strain and damage flora potentially driving native fauna out of a region.

Relevance to Damper Creek Conservation Reserve

From a VBA search 2043 different instances of Common Mynas were recorded. This number is likely much higher however given how common this species is in urbanized environments. The presence of the Common Myna within DCCR reduces the available nesting opportunities and food resources

for the native bird species commonly observed. This is the case for sensitive bird species such as small woodland birds that have already been observed as declining within the reserve. The consistent presence of the Common Myna within the reserve has the potential to deter native species from inhabiting due to their aggressive mob mentality.

3. COMMON MITIGATION MEASURES IMPLEMENTED

Various methods can be implemented to control each identified animal. Across Victoria, different methods are used depending on the impacts that the target animal has on the environment as well as where the mitigation measures are taking place. Below are some control and mitigation methods that could be adopted for the control of these species within DCCR.

Common mitigation measures implemented for **dogs** include:

- Control of dogs through establishing dog 'on leash' only reserves';
- Exclusion of dogs through fencing areas of high biodiversity and;
- Complete exclusion of dogs from a reserve

Common mitigation measures implemented for **cats** include:

- Implementing and maintaining a cat curfew to prevent cats from being outside at night;
- Local council implementing only inside/secured cats or no cat ownership for households surrounding reserves/areas of conservation significance and;
- Control of feral cat populations in the area by;
    - Trapping
    - Baiting

Control measures for **foxes** includes:

- Monitoring of fox populations for presence/absence;
- Baiting;
- Den fumigation or ripping
- Ethical Trapping
- Exclusion fencing

Control measures for **Common Mynas** includes:

- Ethical trapping (implemented in other councils such as Cardinia Shire)

4. POSITIVE OUTCOMES TO FLORA AND FAUNA

There are multiple positive outcomes that may occur through the management of unrestricted dogs (off leash) within an environment, such outcomes include:

- an increase in small bird and mammal populations that may have previously been deterred or left an area from to induced stress;
- reduction of weed spread;
- improvement in water quality; and
- retainment of revegetation efforts; and
- reduced pollution in the environment

Positive outcomes that can occur though the control/management of cats and foxes includes the reduction on predation on small mammals, birds, amphibians, reptiles and invertebrates which are commonly preyed upon. Control of these species will also reduce the amount of weed spread and growth throughout the Reserve.

Positive outcomes that can be achieved with the reduction of Common Mynas is the reintegration of native birds that would commonly be bullied out of nests, hollows and feeding areas as well as increased populations of native birds due to their eggs not being destroyed. Common weed seed dispersal would also be slowed due to the reduction of scats spreading weed propagules.

5. RECOMMENDATIONS FOR MONASH CITY COUNCIL

It is recommended that Damper Creek Conservation Reserve become a designated dog 'on-leash' reserve to reduce the impacts that unrestricted dogs have on flora and fauna vales. As stated in the *Damper Creek Conservation Reserve Conservation Management Plan* a "dog-off-lead area could be implemented at the previously designated area adjacent to Park Road, to reduce the impact to ecological values within the reserve." (McKinnon 2022). This would provide dog owners with an area where dogs can be 'off leash' and therefore localise the impacts that domestic dogs have within DCCR to a relatively cleared area. Fencing this area may be an option to reduce dogs from roaming further then the cleared area present and promote people to leash their dog once exiting the fenced area and continuing their walk through the remainder of the reserve.

Council should consider appropriate ways to reduce the impact that cats (both feral and domestic) have on the native ecosystem. Implementation of a cat ban could be considered if deemed appropriate or a cat curfew preventing cats from being outside at night could also be considered, a method

recently implemented in multiple councils across Melbourne. It is up to Council to deem what mitigation measures area appropriate to reduce the impacts of cats.

Foxes within DCCR should be reported by Council Staff when sighted and potentially a reporting system established, where residents can report fox sightings and/or evidence of foxes. Such a system would help in directing management efforts such as trapping and den destruction when appropriate in order to reduce fox presence within the area.

Monitoring of Common Myna populations should be implemented to identify population sizes and areas where they frequent. If deemed necessary and in Councils scope trapping (using 'Pee Gee' traps) could be implemented similarly to what other councils have implemented.

6. CONCLUSION

Any introduced animal will likely have negative effects on the natural environment. Dogs can deter, injure and/or kill native animals whilst also spreading seeds of invasive weed species, increasing nutrients within the soil and waterways from faeces. It is for these reasons that if Damper Creek Conservation Reserve was to become a 'dog on-leash' area the impacts that unrestricted dogs have on the native flora and fauna values would be reduced and management efforts may be directed to controlling other domestic and invasive pest animals that require more effort and persistent management to control.

References

Angelier F., Parenteau C., Trouve C., Angelier N., (2016) *Does the stress response predict the ability of wild birds to adjust to short-term captivity? A study of the rock pigeon (Columbia livia)*. Royal Society Open Science vol. 3 issue 12. Accessed via: https://royalsocietypublishing.org/doi/10.1098/rsos.160840

AVA (2015) *Management of cats in Australia*, Australian Veterinary Association. Accessed via: https://www.ava.com.au/policy-advocacy/policies/companion-animals-management-and-welfare/management-of-cats-in-australia/

Banks, P., Bryant J. (2007) *Four-legged friend or foe? Dog walking displaces native birds from natural areas*. Biol. Lett. 3: 611-613. Accessed via: http://doi.org/10.1098/rsbl.2007.0374

Buchholz S., Seitz B., Hiller A., von der Lippe M., Kowarik I., (2021) *Impacts of dogs on urban grassland ecosystems*. Landscape and Urban Planning Volume 215. Accessed via: https://doi.org/10.1016/j.landurbplan.2021.104201

Coman B (1973) *The diet of red foxes, Vulpes vulpes L., in Victoria*. Australian Journal of Zoology 21 (3) 391-401. Accessed via: https://www.publish.csiro.au/zo/ZO9730391

de Campos C., Esteves C., Ferraz M., Crawshaw P., (2007) *Diet of free-ranging cats and dogs in suburban and rural environment, south-eastern Brazil*. Journal of Zoology 273(1) 14-20. Accessed via: https://www.researchgate.net/publication/227539087_Diet_of_free-ranging_cats_and_dogs_in_a_suburban_and_rural_environment_south-eastern_Brazil

Coman B., Brunner H., (1972) *Food habits of the feral house cat in Victoria*. Journal of Wildlife Management, 36, 848-853. Accessed via: https://doi.org/10.2307/3799439

DELWP (2017) *Impacts of Foxes in Wetlands*. Department of Environment, Land, Water and Planning. Accessed via: https://www.water.vic.gov.au/__data/assets/pdf_file/0023/61178/Impact-of-Foxes-on-Wetlands-Fact-Sheet-2.pdf

DPIRD (2021) *Common myna: animal pest alert.* Department of Primary Industries and Regional Development. Accessed via: https://agric.wa.gov.au/n/2018

DSEWPC (2010) *European Red Fox (Vulpes vulpes),* Department of Sustainability Environment, Water, Population and Communities. Access via: European Red Fox (Vulpes vulpes) - Fact Sheet - PDF (dcceew.gov.au)

Hennings L. (2016) *The impacts of dogs on wildlife and water quality: A literature review*. Metro Parks and Nature. Accessed via: impacts-of-dogs-on-wildlife-water-quality-science-review.pdf (oregonmetro.gov)

Holderness-Roddam, B. (2011). *The effects of domestic dogs (Canis familiaris) as a disturbance agent on the natural environment*, University of Tasmania

Loyd K., Hernandez S., Carroll J., Abernathy K., Marshall G., (2013). *Quantifying free-roaming domestic cat predation using animal-borne video cameras.* Biological Conservation, 160, 183-189. Accessed via: https://doi.org/10.1016/j.biocon.2013.01.008

McKinnon F. (2022) *Damper Creek Conservation Reserve Conservation Management Plan*. Prepared by Practical Ecology Pty. Ltd. for the City of Monash

Mitchell B & Banks P (2005) *Do wild dogs exclude foxes? Evidence for competition from dietary and spatial overlaps*. Austral Ecology, 30: 581-591. https://doi.org/10.1111/j.1442-9993.2005.01473.x

Medina F., Bonnaud E., Vidal E., Tershy B., Zavaleta E., Donlan J., Nogales M., (2011) *A global review of the impacts of invasive cats on island endangered vertebrates.* Gloval Change Biology, 17, 3503-3510. Accessed via: https://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2011.02464.x

NSW DPE (2021) *Foxes*. New South Wales Government. Accessed via: https://www.environment.nsw.gov.au/topics/animals-and-plants/pest-animals-and-weeds/pest-animals/foxes#:~:text=Foxes%20are%20a%20pest%20animal,poultry%2C%20lambs%20and%20goat%20kids

Robertson M., (2019) *Stress and Rescued Wild Birds*. Learn Bird Care. Accessed via: https://www.learnbirdcare.com/post/stress-and-rescued-wild-birds

RSPCA (2020) *Possum illness on the rise: Dermatitis*. RSPCA Queensland. Accessed via: https://www.rspcaqld.org.au/blog/wildlife-conservation/possum-dermatitis

Trouwborst A., McCormack P., Camacho E., (2020) *Domestic cats and their impacts on biodiversity: A blind spot in the application of nature conservation law*. People and Nature, 235-250. Accessed via: https://besjournals.onlinelibrary.wiley.com/doi/10.1002/pan3.10073

Queensland Govt. (2020) *European fox Vulpes vulpes*. Queensland Government. Accessed via: https://www.daf.qld.gov.au/__data/assets/pdf_file/0019/73810/european-red-fox.pdf

van der Meulen A., Sindel B., (2008) *Pathway risk analysis for weed spread within Australia (UNE61)*. University of New England. Accessed via: https://www.une.edu.au/__data/assets/pdf_file/0004/20587/Pathway-risk-analysis-for-weed-spread-within-Australia,-Appendix-3.pdf

Woinarski J., Murphy B., Legge S (2020) *The impact of cats in Australia*. National Environmental Science Programme (NESP)

Appendix 1. VBA 5km Search for Introduced Fauna

Scientific Name	Common Name	Count of Sightings	Last Record
Carassius auratus	Goldfish	3	29/01/2002
Cyprinus carpio	European Carp	4	24/01/2018
Misgurnus anguillicaudatus	Oriental Weatherloach	4	30/01/2002
Gambusia holbrooki	Eastern Gambusia	7	28/04/2010
Perca fluviatilis	Redfin	1	19/11/1991
Anas platyrhynchos	Mallard	131	8/06/2021
Columba livia	Domestic Pigeon	478	23/08/2021
Spilopelia chinensis	Spotted Dove	3281	23/08/2021
Turdus merula	Common Blackbird	1312	23/08/2021
Turdus philomelos	Song Thrush	96	18/04/2021
Alauda arvensis	Eurasian Skylark	8	19/04/2006
Passer montanus	Eurasian Tree Sparrow	31	10/07/2006
Passer domesticus	House Sparrow	621	18/01/2021
Chloris chloris	European Greenfinch	61	1/09/2001
Acridotheres tristis	Common Myna	2043	23/08/2021
Sturnus vulgaris	Common Starling	1060	19/08/2021
Rattus rattus	Black Rat	10	18/01/2018
Rattus norvegicus	Brown Rat	5	25/10/2017
Mus musculus	House Mouse	3	27/05/2013
Oryctolagus cuniculus	European Rabbit	1	12/05/1989
Felis catus	Domestic Cat (feral)	3	25/05/1988
Vulpes vulpes	Red Fox	19	25/10/2017
Anser anser	Domestic Goose	3	21/04/2010
Carduelis carduelis	European Goldfinch	86	26/08/2003
Anas superciliosa X Anas platyrhynchos	Pacific Black Duck/Mallard Hybrid	10	26/05/2021