## APPENDIX I

### Impact of domestic and feral dogs in conservation translocations

Dogs are one of the most widely distributed and globally abundant carnivores, and due to human introductions, are now present across every continent except Antarctica (Hughes & Macdonald 2013). The global population of dogs is estimated to comprise 700 million individuals, approximately 75% of which are free roaming (Massei, Miller, & Killian, 2010). Free-roaming dogs, including those provisioned by owners, can have substantial negative impacts on wildlife, ranging from disease transmission (Mamaev et al. 1995; Woodroffe & Ginsberg 1999), direct predation (Pierce and Sporle 1997; Butler, Du Toit, & Bingham 2004), and by limiting wildlife distributions (Silva-rodríguez & Sieving 2012; Callan et al. 2020), to a host of other issues.

Conflicts between domestic dogs and wildlife may happen within protected areas, private owned plots, and in areas of mixed forest use, such as those grazed by livestock (Callan et al. 2020). Unfortunately, regulations concerning the ownership or control of dogs are frequently absent or have low compliance, as is the case with leashing-laws (Gompper 2014). As such, the potential presence of free-ranging and feral dogs at release sites for conservation translocation programs may be a key consideration for program success and require planning for mitigation throughout the project cycle.

However, domestic dogs can also provide high value to their owners for myriad reasons, including those that are affective, such as their attachment for companionship or love, or utilitarian reasons, including security for individuals, crops, livestock, or personal property, hunting, or others. The value that dogs have for their owners may cause them to avoid taking responsibility for the behaviours of their own dogs, disbelieving their capacity to do harm, or placing blame on wildlife or non-existent feral dogs for the negative actions of their own dogs (Waters et al. 2018). Moreover, local people may be reluctant to work with conservation practitioners to assess the threat of dogs to reintroduced wildlife for fear that it may lead to new regulations against dog ownership or restrictions on their care.

**Recommendations:** Including dog presence and threat potential in release site selection assessment criteria • Sharing management and control responsibilities between dog owners, project and government • Identifying village and owned dogs• Reducing the number of free-ranging dogs by using non-lethal and lethal control• Controlling dog populations and disease vectors • Building an understanding of the social context of the relationship between local people, reintroduced species, and dogs to collaboratively find alternative solutions to utilitarian needs filled by dogs• Addressing beliefs and attitudes associated with cultural constructs, to change behaviours (HWIWG 2018).

### Addressing issues related to feral and domestic dogs, and dog owners

#### Reintroduced animals’ behavioural responses to dogs

Captive born animals may be naive to the threat that dogs pose and not respond appropriately or quickly enough to their presence, increasing their vulnerability to injury and depredation, as has been observed in golden lion tamarins (Rio de Janeiro, Brazil, HWIWG 2018) and giant pandas (Wolong, China, HWIWG 2018). The presence of dogs and lack of proper behavioral repertoire needed to coexist with free-ranging domestic dogs may also result in reintroduced animals failing to establish themselves within the release site because of the ecology of fear they are afraid of dogs. Reintroduced carnivores’ conflict with dogs in many ways (attacks; hybridisation; competition for food- interference competition; reintroduced carnivores may attack dogs and provoke retaliation from owners).

Complete removal or control of domestic dogs at a release site may be impossible, and so reintroduction practitioners must take additional steps to reduce their impact on post-release survival. This may be accomplished by exposing release candidates to dogs prior to release under safe/low risk conditions to induce appropriate behavioral responses (Edwards et al. 2020), affixing devices, such as bells, on owned dogs to warn wildlife of dog presence (as has been found effective on cats (Nelson, Evans, and Bradbury, 2005), and vaccinating local dogs for diseases that may transmit to released animals (such as rabies, canine distemper and others).

Released predators may also pose a risk to owned dogs, and this threat should be considered and mitigated against prior to release and throughout the project. In addition to assessing and communicating this risk to the owners, steps should be taken

**Recommendations:** • Captive training reintroduction candidates to avoid foraging on the ground and to avoid dogs • Aversion conditioning to stop wild carnivores’ attacking dogs (such as sour tasting collar, collars with spikes for dogs, electric vests)

#### People's relationships with dogs must also be considered.

Because people are attached to their dogs, and to dogs in general, they may resist management, sterilization programmes or measures to regulate their presence. Dogs may also have utilitarian value to people as working dogs are used for protection and security, guarding homes, crops and livestock and for protecting owners. It is possible to find owners that avoid responsibility over the behaviour of their own dogs, or do not recognise that dogs from their own village may cause damage (e.g. panda in China, HWIWG 2018, Waters et al 2018).

**Recommendations:** • Gaining the support of local people • A better understanding of people’s behaviours in relation to managing their dogs would help identify which areas need to be addressed (knowledge, attitudes, norms, etc…) and the best ways to address them (education, compensation, regulation…). • Listening to local leaders, interest groups and people in general to understand the role of dogs in the community, etc… • Understanding how dog owners and other people in the community relate to local wildlife and to the reintroduction project. A lack of engagement and care may affect people’s behaviours towards the effect their dogs may have on wildlife. • Project may need to take the initiative on action, to lead local people towards changing their behaviour by for example providing services such as: a programme of inoculation or neutering of free roaming dogs, vaccination campaign, dog collars, microchipping, sterilization, control/relocation/pounding of dogs found within protected areas, free or subsidized breeding/providing/training of livestock guardian dogs/territory guarding dogs, who have been vaccinated and spayed/neutered, to local people (e.g. wolves in Europe and USA (WL); trading dogs for another species that may benefit local people but do not affect reintroduced animals; alternative guard animals, e.g. geese. (see HWIWG 2018 for more).

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