DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Conserving and managing flying-foxes in New South Wales

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Saving our Species project for the grey-headed flying-fox

Key threats addressed in action toolbox:

1. Loss of foraging habitat
2. Loss of roosting habitat
3. Conflict with humans at camps
4. Heat stress
5. Incidental mortality
6. Shooting
7. Limited understanding of population trends

Download the strategy on the DPIE website:
www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10697

Photos: Matthew Mo

In this presentation

1. Managing flying-foxes on private land
2. Heat stress management
3. Phase-out of licences to shoot flying-foxes

SAVING OUR SPECIES

Grey-headed flying-fox conservation project in 2020

In NSW, flying-foxes are protected under the *Biodiversity Conservation Act 2016* and the grey-headed flying-fox is listed as vulnerable to extinction under this Act.

Saving our Species is the NSW Government's statewide program that aims to secure threatened plants and animals in the wild in NSW. Under this program, the grey-headed flying-fox is assigned to the Landscape species management stream. Landscape-managed species are best assisted by addressing threats such as habitat loss or degradation within a landscape.

Population monitoring

Saving our Species continues to coordinate the census counts for the National Flying-fox Monitoring Program in NSW. Unfortunately, the May and August 2020 census did not go ahead formally due to the COVID-19 pandemic. However, we appreciate all volunteers and land managers who nevertheless undertook their counts.

Foraging and roosting habitat

Saving our Species has been working with Local Government NSW to launch the Flying-fox Habitat Restoration Program in 2020-21. The establishment phase of the program supported the development of a model to prioritise areas suitable for flying-fox habitat restoration, particularly alternative sites near contentious camps.

The foraging habitat mapping has been updated to encompass all of NSW and incorporate the diets of all three species of flying-fox. The spatial data is expected to be available on the NSW Government's SEED portal soon.

Ongoing efforts to restore flying-fox habitat continue to be informed by guidelines for planting food trees for nomadic pollinators.

Saving our Species is collaborating with Ecosure and Dr Peggy Eby to understand the impacts of the 2019-20 bushfires on flying-fox foraging habitat. Modelling of potential camps burnt has shown that 21 known camps were

Saving our Species staff re-planting Milton-Ulladulla subtropical rainforest, a threatened ecological community that flying-foxes forage in. Photo: M. Mo

environment.nsw.gov.au/sos

Photos: Matthew Mo

Flying-fox camps on private land

Managing flying-fox camps on private land

Situations vary between cases

- Berry

  Flying-foxes in creek-line vegetation at the back of large residential lots

- South Grafton

  Flying-foxes in backyard trees on small residential lots

- Lennox Head/Tuross Heads

  Flying-foxes in privately-owned bush blocks adjacent to residential homes

- Tenambit

  Flying-foxes in trees within the premises of an aged care facility

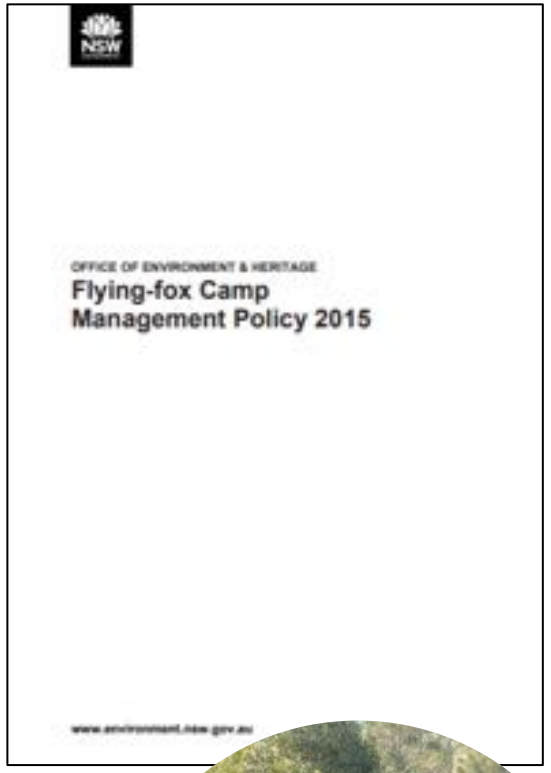

Photo: Matthew Mo

Managing flying-fox camps on private land

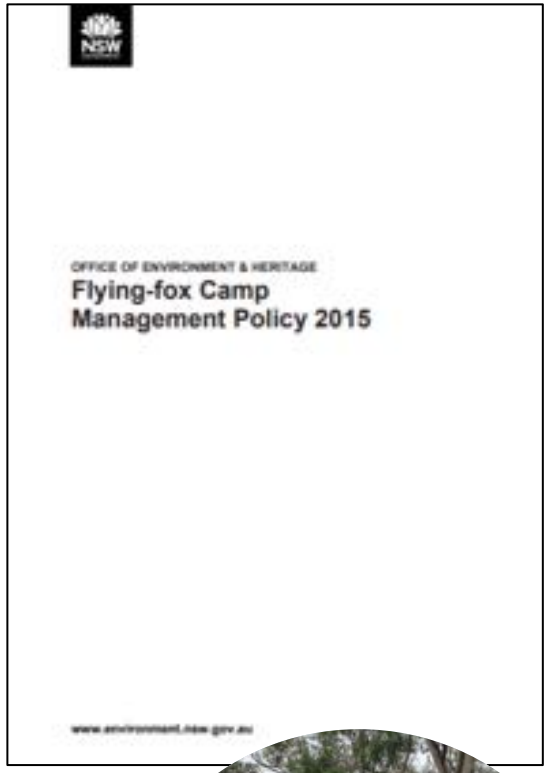

Photo: Lorraine Oliver

Heat stress management

Heat stress management

- Stakeholder consultations commenced in November 2019
    - Led to development of the consultation paper on proposed roles and responsibilities

NSW GOVERNMENT

Managing heat stress in flying-fox camps

Roles and responsibilities

Consultation Paper

August 2020

Corporate support for threatened species recovery efforts: three case studies from the 2019-20 Australian bushfire season

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ABSTRACT

A diverse range of corporations, businesses and organisations play an important role in threatened species conservation. During the unprecedented bushfire season in Australia in the 2019-20 summer, corporations, businesses and organisations contributed significant financial and in-kind support for the Saving our Species Program's threatened species recovery efforts. On the eastern coast, a combination of food shortages and heat stress events resulted in large numbers of Grey-headed Flying-foxes Pteropus poliocephalus requiring rescue and rehabilitation. Prolonged drought and intense bushfires reduced available foraging resources for the Brush-tailed Rock-wallaby Petrogale penicillata and Mountain Pygmy-possum Burramys parvus. Corporations donated produce to feed flying-foxes in care and provide supplementary feeding for wild populations of rock-wallabies and pygmy-possums. Local businesses and organisations also supplied resources, funding and food storage capacity to support these conservation actions. The contributions from corporations, businesses and organisations in these case studies totalled more than $75,000.

Key words: aerial food drops, Brush-tailed Rock-wallaby, Grey-headed Flying-fox, Mountain Pygmy-possum, supplementary feeding, wildlife rehabilitation

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Introduction

Australia has been in drought for most of the 21st Century to date, first with the Millennium Drought from 2001 to 2009 (Nolan 2012), then the current drought that began in late 2016. This has had an enormous impact on human communities, the economy, and natural environment in drought-affected areas (van Dijk et al. 2013). More recently, during the 2019-20 summer, a number of concurrent mega-fires across Australia burnt more than 10.7 million ha (Boer et al. 2020; Nolan et al. 2020), destroying houses and claiming human lives (ABS News 2020; Taylor 2020).

During summers, bushfires combined with ongoing drought conditions and heatwaves have an immediate impact on wildlife through the onset of injuries and deaths (e.g. Russell et al. 2002; Wallis 2012). During the 2019-20 summer, expert opinion from the University of Sydney (2020) estimated that more than one billion animals died as a result of the bushfires. However, there are also the knock-on effects that surviving animals are then impacted by the removal of massive areas of vegetation resulting in significant shortages of natural food (Clarke 2008) and refuges (Wang et al. 2014). In addition, drought conditions substantially reduced outdoor water availability in many places (Bond et al. 2008) and many animals collected for wildlife carers may still die during in-situ rehabilitation (Wallis 2012; Mo et al. unpubl. data).

- *Saving our Species* partnered with Woolworths to provide donations of fruit to wildlife carers

Photo: Matthew Mo

Heat stress management

- New sprinkler trial in Parramatta Park, funded by the Flying-fox Grants Program
- Review of intervention methods published in *Australian Mammalogy*
- Research partnership with Western Sydney University to investigate the efficacy of roost microclimate manipulation using sprinklers

CSIRO PUBLISHING
Australian Mammalogy
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Review

A review of intervention methods used to reduce flying-fox mortalities in heat stress events

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Abstract. Heat stress events in Australian flying-fox camps have resulted in significant numbers of flying-fox deaths. The frequency and intensity of such events have increased in recent decades, attributed to anthropogenic climate change. Evidence-based interventions are required to address this growing threat. Responders currently use different combinations of a range of intervention methods. We undertook a systematic review of heat stress interventions, which we classified as either 'camp-scale' or 'individual-scale'. Camp-scale interventions included manual and automated misting of roost vegetation, whereas individual-scale interventions included spraying individual animals or removing them for intensive cooling and rehydration procedures. Our study showed that to date, evaluation of the efficacy of heat stress interventions has been largely anecdotal rather than empirical. This highlights the need for deliberate rigorous studies to evaluate the effectiveness of all the intervention methods described here. It will be especially important to understand the relationship between camp temperature and humidity levels and their influence on flying-foxes' ability to regulate their body temperature, because high relative humidity reduces the ability of mammals to cool themselves using evaporative heat loss. The development of biophysiological measures such as temperature and humidity indices for different flying-fox species would enable meaningful interpretations of intervention trials under controlled conditions.

Additional keywords: biodiversity, bioindicator, body temperature, climatic change, die-offs, flying-fox camp, heat-waves, humidity, misting, temperature, threatened species, *Pteropus*, thermal homeostasis, weather patterns, wildlife management.

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Introduction

There are global concerns about the impacts of anthropogenic climate change on weather patterns and wildlife (González-Orozco *et al.* 2016; Mitchell *et al.* 2018). Meteorological data in the last 50 years have shown an increase in both the duration and frequency of heatwaves in Australia (Steffen *et al.* 2014). Different organisms survive within different ranges of temperature and humidity (Bridgemann *et al.* 2012; Moritz *et al.* 2012), and numerous mass die-offs in wildlife caused by heatwaves have been reported (e.g. Gordon *et al.* 1988; Saunders *et al.* 2011). The degree of heat stress in animals is influenced by a range of environmental factors such as wind speed, solar radiation and availability of shade to hide, as well as internal factors such as insulation, solar reflectance, body mass, health condition and posture (Porter and Gates 1969; Bakken *et al.* 2007; Ratnayake 2019). Heat stress events in flying-foxes are particularly well reported (e.g. Welbergen *et al.* 2008; Ratnayake *et al.* 2019) because flying-foxes are gregarious and conspicuous at camps (Welbergen *et al.* 2014). During heat stress events there may be high mortalities and numbers of injured bats requiring on-site rehabilitation (Fig. 1). Thus, flying-foxes represent an important taxonomic group for understanding the impacts of heatwaves on biodiversity (McKechnie and Wolf 2019), and are considered potential bioindicators of extreme heat impacts on more cryptic species (Welbergen 2012).

Of the four species of flying-foxes on the Australian mainland, the little red flying-fox (*Pteropus scapulatus*) has the highest tolerance for extreme heat, coinciding with its range encompassing vast inland areas prone to ambient temperatures above 42°C (Welbergen *et al.* 2008). The three remaining species, the black flying-fox (*Pteropus alecto*), grey-headed flying-fox (*Pteropus poliocephalus*) and spectacled flying-fox (*Pteropus conspicillatus*) have lower tolerances to extreme heat, and may experience mortalities concurrently at the same sites that little red flying-foxes do not (Welbergen *et al.* 2008; McKechnie and Wolf 2019). During hot conditions, a range of bat species use thermoregulatory behaviours to maintain thermal homeostasis including saliva-spreading and panting (Bartholomew *et al.* 1964; Welbergen *et al.* 2008) to induce evaporative cooling (Licht and Leitner 1967*a*), wing-fanning to induce forced convection (Lahiere and Mitchell 1975) and shade-seeking to reduce solar radiation exposure

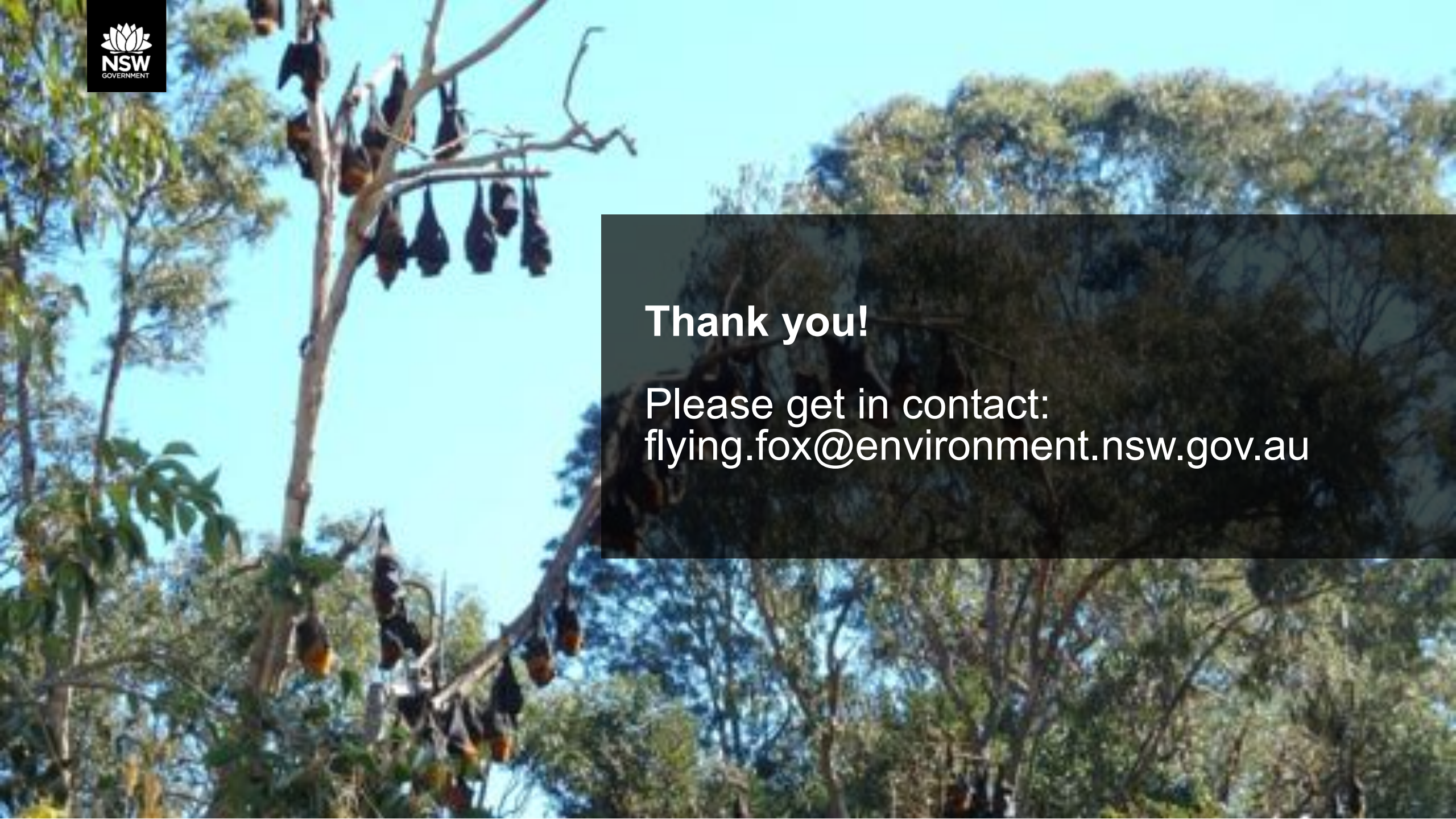
Photos: Matthew Mo

Phase-out of licences to shoot flying-foxes

Phase-out of licences to shoot flying-foxes

- **Flying-fox Netting Subsidy Program**
  - Implemented from 2011 to 2017
  - The investment of $7.1 million achieved more than 685 ha of netted area
- **Special circumstances for granting licences to shoot flying-foxes**
  - Since 2015, all shooting licences have been granted on the account of one special circumstance.
  - This special circumstance expired in June 2020.
  - The remaining special circumstances have been updated to expire in June 2021.

Photos: Matthew Mo



Thank you!

Please get in contact:
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