KFBG BLACK-EARED KITE WING TAGGING PROJECT

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INTRODUCTION

The black- kite is the most common diurnal raptor in Hong Kong. It is classified as “least concern” by the International Union for Conservation of Nature (IUCN) and it is widely distributed with a breeding range that spans from Australia to Spain and Morocco and extending north to Mongolia and Russia, migrating over the Eurasian range and wintering in the sub-Saharan regions. Resident populations can be found in South-East Asia (including Hong Kong), Eastern Asia and, to the south, in Oceania (Australia and Papua) where passages are also seen, indicating that part of the population is also migratory.
Black kites often soar in the sky in urban areas; indeed, Victoria Harbour and Kowloon Bay are the regions of Hong Kong where their congregations are most dense. They are carnivorous and mainly feed on fish, reptiles, birds and small mammals. They are also scavengers, feeding on dead fish floating on the water surface (Fulton and Cheung, 2017) (IUCN, 2022).

For consistency and comparative purposes the period of post-release survival whereby the kites were considered to have successfully adapted to the wild conditions, indicated by feeding success and undertaking of other normal wild behaviour, was taken as 42 days following Duke et al (1981).

Wing-tag use outside Hong Kong

Many methods exist to help track the behaviour and outcomes of individual animals in the wild, including: visual identifiers such as leg bands, leg flags or wing tags; physical identifiers such as microchips; and tracking devices such as VHF transmitters and GPS/GPRS transmitters. The choice of method depends on

the species released and the data that needs to be collected. Ecologists and conservationists may want to retrieve data about animal movements, migration and nesting/breeding patterns, locations and growth rates, and territoriality. Rescue centres involved in wildlife rehabilitation or reintroduction may want to monitor post-release survival and behaviour.

For birds in Hong Kong, authorised ringing groups have for many years fitted leg bands on birds in the field according to British Trust of Ornithology protocols (Welcome to the British Trust for Ornithology | BTO - British Trust for Ornithology). Meanwhile, staff at the Kadoorie Farm and Botanic Garden (KFBG) Wild Animal Rescue Centre, often in collaboration with other groups, have fitted a range of identifiers and transmitting devices on rehabilitated birds prior to wild release. These methods have yielded multiple types of data in numerous species, including the black- kite (*Milvus migrans*), the common buzzard (*Buteo buteo*), the great cormorant (*Phalacrocorax carbo*), the black-winged stilt (*Himantopus himantopus*), the black-faced spoonbill (*Platalea minor*), brown wood owl (*Strix leptogrammica*), white-bellied sea eagle (*Haliaeetus leucogaster*), and brown fish owl (*Ketupa zeylonensis*). However, to date, wing tags have never been used for bird monitoring in Hong Kong.

The practice of marking birds with wing tags is quite common in the United Kingdom (UK) and the United States (USA). In the UK, wing tags have played a major role in monitoring the reintroduction of the red kite (*Milvus milvus*); tags are placed on both wings to indicate the year and location of tagging (Wing Tagging and Ringing (friendsofredkites.org.uk)).

Below are some examples of other species in which wing tagging has been employed:

- Crows Tag and marking information (cornell.edu), (Stiehl, 1983)
- Vultures Colour Rings Wing Tags (portugalwildlife.com)
- Pelicans Wing-tagged pelicans « Birding-Aus
- Eagles eagle wing tags – Mary Ann Steggles, Pelicans and Vultures Color Bands & Why They Are Important — Bloom Biological Inc.,
- Passerines (Hester, 1963)
- White ibis (Martin and Major, 2010)
- Golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), prairie falcons (*Falco mexicans*) and common ravens (*Corvus corax*) (Kochert et al., 1983), Sulphur-crested cockatoos (*Cacatua sulphurea*) (Davis et al., 2017)
- Others - About Auxiliary Markers | U.S. Geological Survey (usgs.gov),

Wing tags have several advantages over other methods. Unlike small metal leg bands, wing tags can be directly read, or photographed and read, at a distance; the bird does not have to be caught or held in hand. This means data can be collected by any person in the community as the birds go about their normal activities. Wing tags are cheaper than transmitting devices and may last longer than a GPS transmitter's battery (Kochert et al., 1983).

The case for using wing tags to monitor post-release survival in Hong Kong

It is a common misconception that 'rehabilitation success' can be measured in terms of the proportion of animals released back to the wild. In fact, rehabilitation can only truly be considered successful if the

animal successfully survives (and thrives!) after its release and for a standard period of time. In an ideal world, rescue centres should collect post-release survival data (mortality rate, life expectancy, dispersal, etc) from all animals released. In reality, post-release monitoring happens only in a small number of cases. Common barriers include the financial cost (especially for rescue centres with a limited budget and a high caseload), manpower constraints (tracking can be very labour intensive) and handling a wide range of species (as identifiers and tracking devices need to be tailored to the species).

Birds received at KFBG Wild Animal Rescue Centre

Black- kites are the most common birds of prey in Hong Kong and are regularly received by the KFBG wild animal rescue centre. The most common health issues on admission are impact trauma, young age, bone fractures and feather soiling/damage. In the past 25 years of operation, KFBG has received 423 kites, of which 255 have been released: a commendable release rate (by international wildlife rehabilitation standards) of 60%. However, post-release survival data is lacking. Two kites were fitted with a GPS backpack in 2021 and 2022, but as the devices belong to external collaborators and KFBG does not have direct access to the data. Due to resource constraints, we are unable to organise GPS tracking of a more representative sample size.

Black-eared kites are a good candidate species for a KFBG post-release monitoring project due to the relatively high numbers received and released: provided a cost-effective monitoring method is used, we should soon be able to build up a large enough sample size for statistical analysis. In addition, the data collected can be used to provide feedback on the rehabilitation process, hopefully improving decision-making and outcomes for all future kites in our care.

Wing tagging is the ideal method to employ to accomplish the objectives of this project: wing tags have been used very effectively, with no recorded adverse effects, in a related species in the UK (red kites; John Barrett, personal communication); they are very cost effective; and the visibility of both the tags and the black-eared kites themselves makes this an accessible and interesting project for citizen science, providing an alternative monitoring option and addresses rescue centre manpower and resource constraints. Involving the public also increase the potential geographical study area (Davis et al., 2017, Mougeot and Bretagnolle, 2006, Evans et al., 1999).

Credit John Barrett, U's Red Kite Project, Wing-tagging juvenile birds

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STUDY METHODS

With authorisation from AFCD, all kites rescued and rehabilitated by KFBG will be fitted with bilateral wing tags during their standard health check (with or without other identifiers).

The wing tags will have a standard design with a QR code and a unique number. The project will be publicised, on KFBG's social media platforms and through KFBG's partner organisations. A press release is also planned following results of the first successful trial.

When scanned by a member of the public, the wing tag QR code opens a simple online form where the citizen scientist can record data about which kite was seen, where it was seen and its activities. The data thus collected will be collated and analysed by KFBG staff and then fed back into the rehabilitation process.

Health check and wing tag application

Rehabilitation and release requirements will be assessed for every bird according to the current KFBG guidelines. The rehabilitation and veterinary teams must be satisfied that kites are injury-free, disease-free and fit to survive in the wild prior to release. The release will be considered a success when the bird is recorded to have survived over 30 days (a standard for large hawks). To reach this period the bird must have been successfully hunting and feeding adequately to avoid starvation.

All kites arriving at KFBG undergo initial triage and stabilisation. Once stable, they receive an anaesthetic, during which the following will be done by a veterinarian:

- A full physical examination, including age estimation.
- Radiographs (X-rays) and blood testing.
- Microchip implantation.
- Wing tag fitting on both wings.

During their stay at the rescue centre, kites are also fitted with a leg band according to BTO standards.

Wing tag design and application

KFBG wing tags for black-eared kites have been designed in discussion with an experienced fitter of wing tags on red kites in the UK, taking the same core principles but adjusting them for the size and shape of black-eared kites.

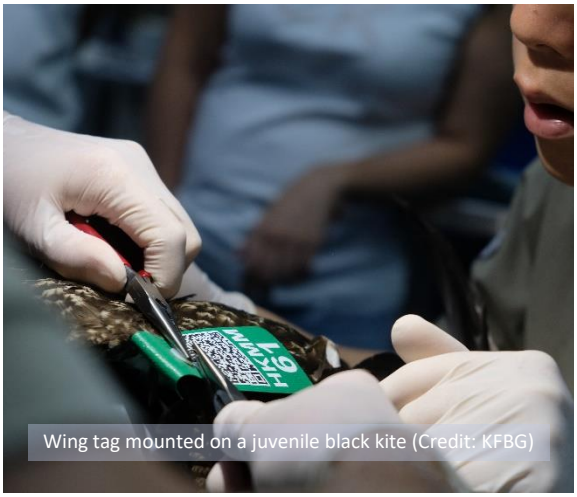
KFBG wing tags are made of green, UV-proof, soft, flexible, lightweight plastic canvas. The white lettering is also UV-proof (i.e. will not be degraded by continuous exposure to sunlight).

The wing tags will carry the following information:

1. The side on the outside/upper side of the wing
    a. QR code linked to a fillable form for sighting data collection
    b. HKMMXX (HK: Hong Kong, MM: *Milvus migrans*, XX: unique number)
2. The side on the inside/underside of the wing
    a. Same QR code as above
    b. MMXX (MM: *Milvus migrans*, XX: unique number)

The tag number and QR code may not be visible at height. However, a photo taken by a member of the public and zoomed in on at home would show the code, allowing the photographer to connect to the online form and fill in the details.

Wing tag mounted on a juvenile black kite (Credit: KFBG)



Wing tag mounted on a juvenile black kite (Credit: KFBG)

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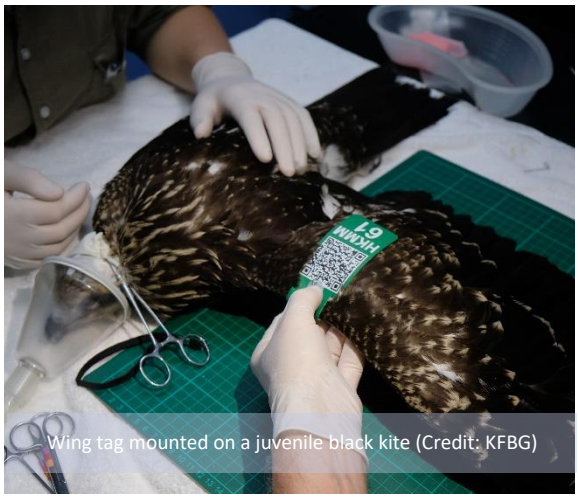

Wing tag mounted on a juvenile black kite (Credit: KFBG)

DISCUSSION

Expected benefits for conservation

- Post-release survival data for the black- kite in Hong Kong (or further afield should they fly so far)
- Statistical analysis of whether certain health issues on admission or certain aspects of rehabilitation affect post-release survival
- Continuous improvement of rehabilitation practices for future kites in care
- Raised awareness among members of the community and opportunity for citizen science
- Secondary ecological data on the home range and behaviours of kites in Hong Kong, as well as their ability to cope with the wing tags (problems are not anticipated however verification would be helpful)

Potential welfare concerns

The rescue and rehabilitation period can be a traumatic and significant event in the life of a wild animal. Death – even during rehabilitation or post-release in apparently healthy animals – is a possibility and can be dependent on primarily two factors:

1. factors intrinsic to the individual (age, sex, size, body condition, clinical status, underlying diseases, stress) and
2. factors related to the human rescue intervention (rescue protocol, habituation, stress levels and release location) (Cope et al., 2022).

The negative impacts of tagging systems have rarely been reported, but it does not mean that there are none. Relative damage caused by different tagging or tracking systems can vary among species. For example, telemetry backpacks caused such severe lesions in red kites in the UK that they were deemed unsuitable for that species, whereas most of the literature on tracking devices in birds has reported just a few cases of detrimental effects on birds' survival (Dixon, 2011).

Where wing tags are concerned, feather abrasions, unusual behaviour and possible death have been reported (Kochert et al., 1983). Also noted are physical injury, breeding failure and social rejection (Davis et al., 2017).

Szymczak and Ringelman (1986) reported that mallards with wing tags were more susceptible to being hunted, undergoing behavioural changes affecting migrations, nest desertion and higher mortality rates.

A study carried out on vultures (Curk et al., 2021) demonstrated that vultures fitted with wing tags were less likely to fly, and flew slower and shorter distances compared to vultures with leg rings. One on frigate birds (Trefry et al., 2013) demonstrated a lower nesting success compared to non-tagged birds. However, according to John Barrett (Kite Welfare Officer, Friends of Red Kites), in years of tagging red kites in the UK, no adverse tag effects have been recorded.

There has to be a trade-off between scientific gains and the direct survival benefits of long-term deployment of tagging devices, and guidelines aim to address the dilemma of animal welfare (Dixon, 2011). Negative impacts have been described in the literature, however, there are more success stories than failures and in the UK wing tags have been instrumental in monitoring and confirming the successful reintroduction of red kites (Evans et al., 1998).

EVALUATION PLAN

The KFBG Black-Eared Kite Wing Tagging Project will be periodically reviewed and modified as needed to improve welfare, data collection and outcomes. Should any welfare concerns appear they can be reported either on the online form or directly to KFBG. The online form may be modified if it is decided that the project would benefit from the collection of additional data. This is planned as a long-term project based on the success of the trial, and fine-tuning over the years is anticipated. Should this project prove valuable, in terms of the kite survival and the output of information we may consider extending it to additional bird of prey species.

TIMETABLE FOR TRIAL RELEASE

This will be the defined period of the trial and if successful a longer term use of wing tags will be adopted.

Trial Release Period	Jul to End of August 2023
No of Birds tagged	5
Reporting	After every release
Data collection	Citizen science (public feedback)/bird rescue/staff sightings
Expected outcomes	Monitoring movements, post-release survival, ecology (nesting, courting, mating, habitat choice, dietary preference), feeding behaviour, Interaction with other bird species

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