Marking Vultures – Rings, Tags & Harnesses

Standardisation, coordination and sharing of vulture marking techniques in the SAVE region can significantly enhance monitoring efficiency and help avoid unnecessary duplication and confusion – especially with an increasing need for such marking and more organisations and people engaging in such activities across South and SE Asia. The SAVE Technical Advisory Panel has drawn on experience from the region and wider expertise here and welcomes feedback for further refinement in future. This is guidance is applicable for marking and tagging of wild vultures as well as those being released from captivity. There are also welfare considerations.

The need

The survival rate of marked wild vultures should be monitored before releases occur and all vultures released from the various conservation breeding programmes in Asia should be fitted with GPS transmitters to allow intensive monitoring of birds' movements, survival and causes of mortality. This monitoring should continue at least until sufficient information has been gathered for a given area and high survival has been demonstrated. However, even when vultures are GPS-tagged, the use of secondary markers has proven very useful for monitoring. In Nepal for example, these secondary markers have enabled observers to confirm when birds were alive after their GPS tags have failed or fallen off. Such confirmation has had a marked effect on resulting estimates of annual survival rates for wild-caught White-rumped Vultures (95% CIs): 0.964 (0.926, 0.985) vs 0.914 (0.866, 0.949). Hence, having durable and visible marks on all birds (wild and released) is a very important element for monitoring. Such tagging should include all wild-caught and released captive birds that are not GPS-tagged or where tags have failed. It is well established that both wing-tags and plastic (Darvic) coded rings are not durable, and break or fall off after time, seriously compromising long-term monitoring findings.

Wing tags vs leg rings

The use of wing tags was initially advised for cathartid vultures due to foot and leg lesions caused by rings (Wallace *et al*. 1980), and has been (and continues to be) successfully used on New World vultures, e.g., California Condor *Gymnogyps californianus* (Parish 2020). They have also been widely used in southern Africa (Botha 2007). However, wing tags also have potential negative effects, both on bird welfare and data integrity. Here, we compare the efficacy of wing tags with leg rings. Firstly, the issue alluded to above of problems associated with the use of leg rings in New World vultures may not be such an issue for Old World species, as the latter do not habitually defecate on their legs as Cathartid species do (e.g., Turkey Vulture *Cathartes aura*; Hatch 1970).

<u>Welfare</u>

- Unless wing tags are fitted correctly, taking into consideration the anatomy of the birds' wings (Forbes 2020), considerable harm can be caused. Hirschauer *et al*. (2019) reported several cases where recaptured vultures had to have their wing tags removed and the birds rehabilitated.
- There is evidence that wing tags can hinder the flight performance of Cape Vulture *Gyps coprotheres* (Curk *et al*. 2021), with birds with wing tags flying shorter distances and slower compared to birds fitted with leg rings. Although not measured during this study, there is a suggestion that it could impact birds' body condition and survival. However, it could also impact upon data integrity

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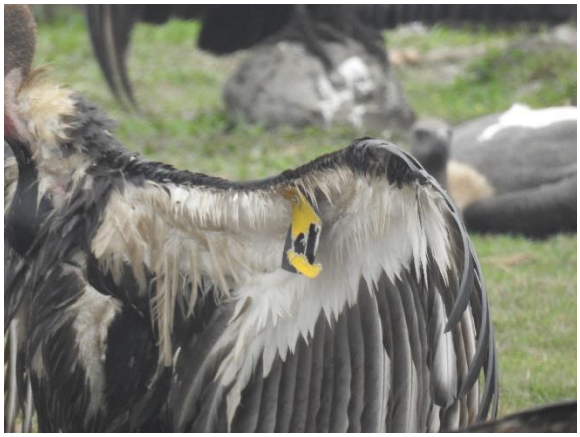
Data integrity

- If the presence of tags (or any other mark) affects flight performance, then it might also cause biases in the data collected.
- Vultures are long-lived birds and monitoring programmes are also carried out over long timespans, so rely on the ability to being able to identify individuals over the lifespan of a project. There is evidence that wing-tags can be removed by vultures (Kirk 1988) and that tag loss increases over time (Silvy *et al*. 2012), thus casting doubt on their suitability for long-term monitoring programmes. Similarly, alphanumeric codes are rendered unreadable, either through fading of the lettering (Monadjem *et al*. 2012) or as a result of birds picking at the tags (*pers. obs;* see image below), calling into question the usefulness of such tags for estimating survival of long-lived birds.



Rings

- **Darvic vs Metal rings?** Darvic (and other plastic) rings are known to have been removed by vultures with reports of birds sequentially removing up to four different rings (S Ranade pers comm). This removal is unlikely to happen with stronger aluminium rings and has not been reported for metal rings secured by two rivets in vultures or in long-term study of White-tailed Eagles, which frequently removed other types of rings (Helander 1985).
- **Design**: experience from Nepal suggests that rings with the alpha-numeric characters oriented top to bottom along the long axis of the ring (see image below), and repeated three times around the ring gives the best chance of speedy identification in the field. Of course, the lettering can be concealed or made less visible by mud / dirt, but this is unlikely to occur for all three of the inscriptions, so it may still be possible to read the ring if the bird or the observer change position.
- **Colour**: the brighter the better, according to the team in Nepal. Originally, the birds in Nepal were fitted with purple rings, but has now changed to bright red. India already has 100 blue rings; Bangladesh is happy with orange. The lettering will always be silver on metal-coloured rings, as it is created by engraving down to the base aluminium. We propose following the national colour coding given in Table 1 below**.**
- **Lettering:** Nepal is currently using the letters N and J (followed by two numbers: 00 – 99). The blue rings in India are prefixed by the letter A. It has been suggested that these could go to Assam, and releases in other states could utilise similarly appropriate letters, e.g., M for birds released in Maharashtra).

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- **Number of rings per bird**: in Nepal, one aluminium ring has been affixed to each bird. However, a suggestion from Assam is that this will cause issues in reading the rings, e.g., when the bird is facing the 'wrong' way. Therefore, it is proposed that two identical rings (same colour / alpha-numeric code) could be fitted to each bird, one on each leg.
- **Ring dimensions:** Internal diameter: 26 mm (*G.bengalensis, tenuirostris, indicus*); 30 mm (*G. himalayensis*) (Suggested-ring-sizes.docx (save-vultures.org)).
  Height: 30 mm
- **Ring design:** Code: three-digit alphanumeric, e.g., A00 – A99
  Design: alphanumeric code written in vertical plane and repeated three times around diameter of ring (see image below)
- **Ring Supplier:** I.Ö. Mekaniska AB
  birdring@telia.com

SAVE TAP Summary Recommendations:

GPS transmitters: In line with SAVE advice, wild birds should be GPS-tagged to confirm the safety of a VSZ, at least until there is evidence, through tagging for the equivalent of 50 x bird-years (VSZ_survival_monitoring10012023.pdf (save-vultures.org)), of > 90% annual survival of adults for a given 100km radius. **All** birds released in an area should be GPS-tagged to allow intensive monitoring.

Tagging and harness design: Fitting of tags to be carried out only by those with adequate experience or training. Although it is acknowledged that there are several harnessing methods used successfully around the world (Anderson *et al*. 2020), SAVE recommends the thoracic X-strap design (SAVE-Thoracic-X-Method-FINAL.pdf (save-vultures.org); Orr-Ewing *et al*. 2020) because of evidence of high survival over a six-year period of a large sample of wild White-rumped Vultures with tags attached using this design.

Rings: birds should be fitted with uniquely coded, double-rivetted, coloured aluminium rings. It is important to ring all birds, even if they also have a GPS tag, because this will allow cases where the tag and harness are lost to be identified. Adding an identical ring to the opposite leg can be considered if it is felt that it would aid identification. Ring colour and the initial letter of the alphanumeric code should be unique to each country and should follow the guidance shown in the following table. It is important that colours used in neighbouring countries should be sufficiently

different to reduce the risk of misidentification. This table can be added to as and when countries begin their own programme of bird tagging.

Country	Colour	Code prefix	Comments
Nepal	Red	N, J	
India	Blue	A, M	Note suggestion to make prefix as A for Assam, M for Maharashtra
Bangladesh	Orange	B	
Cambodia			
Pakistan	Green	K	
Myanmar			

Microchip PIT tags

Where suitably trained and qualified people are available to fit the tags, SAVE recommends that all vultures that are fitted with rivetted metal rings should also be fitted with a subcutaneous microchip (PIT tag). When a recaptured live bird or cadaver is checked with a PIT tag reader this will allow identification in cases where the ring has been lost or the ringed leg is not included in the recovered body parts (SAVE-id-chip-doc.pdf (save-vultures.org)).

SAVE recommends **against** the use any **patagial wing-tagging** for reasons given above.

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