

## Dispersal of Eurasian Black Vulture *Aegypius monachus* fledglings from the Ikh Nart Nature Reserve, Mongolia

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### Introduction

Since 2003 the Denver Zoological Foundation and Mongolian Academy of Sciences have been conducting research into the ecology of Eurasian Black Vultures *Aegypius monachus* in the Ikh Nart Nature Reserve (Ikh Nart) in southeastern Mongolia. The Eurasian Black Vulture is Palearctic in distribution, with a range extending from Spain in the west to southeastern Siberia, Mongolia, and China (Ferguson-Lees & Christie 2001).

Throughout much of their distribution these vultures do not appear to migrate (Meyburg & Meyburg 1983, Ferguson-Lees & Christie 2001). However, using satellite radio-telemetry, Gavashelishvili and McGrady (2006) recorded long range movements of a single bird that fledged in Georgia and then travelled south to Saudi Arabia before travelling north into Russia. Abdusalyamov (1971) noted that at least some birds migrate from the breeding grounds in winter in Tajikistan (and Shibnev (1989) reported vultures appearing during the winter in former Soviet far east. In Mongolia, many adults and fledglings may migrate in autumn from their breeding grounds areas to South Korea, although good data are scarce (Batbayar 2004, Batbayar *et al.* 2006b). We do not know if

any birds migrate to North Korea. We do know that most Eurasian Black Vultures disperse from Mongolia in winter (Meyburg & Meyburg 1983) and Batbayar (2006a) states that some nesting birds and many young birds from central Asia migrate to the Indian subcontinent, southern China, the Russian Far East, and South Korea in winter.

In this paper we discuss our preliminary results on the dispersal of Eurasian Black Vultures from Ikh Nart based on re-sightings of tagged birds.

### Study area

Ikh Nart (GPS location for research centre 45°43'N, 108°38'E), 66,600 ha of open valleys and maze-like rocky outcrops in north-western Province of Dornogobi, was established in 1996 to protect the wildlife, particularly Argali Sheep *Ovis ammon* (Myagmarsuren 2000, Reading *et al.* 2006). Birdlife International designated the reserve an Important Bird Area in 2004, primarily because of its high density of nesting vultures and Lesser Kestrels *Falco naumanni*, a globally threatened and biome restricted species. Semi-arid steppe vegetation covers this high upland (~1,200 m). Climate is strongly continental and arid, characterized by cold winters (low -40°C),

dry, windy springs, and relatively wet, hot summers (high +43°C). Precipitation (~120–140 mm per annum) is low and seasonal, with most falling in the summer. The primary habitat for nesting Eurasian Black Vultures encompasses the northern half of the reserve. We located (from 2004 to 2005) more than 200 active and historically-used vulture nests in the reserve and estimate that 40 to 70 nesting pairs actively use Ikh Nart each year (Reading *et al.* 2005).

### Methods

In 2004 we began visiting Eurasian Black Vulture nests from late-July through early-September to obtain morphometric measurements on fledglings and permanently mark each bird with aluminium leg bands (Reading *et al.* 2005). We placed leg bands (AREANA Inc, ul. Zgierska 124/140 m. 208, 91-320 Łódź, Poland) on the tarsus. Each leg band was inscribed with Ornith. Lab. Inst. Biol. Mongolia followed by a unique number. Beginning in 2005, we began attaching patagial wing tags (Wallace *et al.* 1980) on each wing of fledglings as well. We noted two vultures that lost one wing tag, reinforcing the importance of tagging both wings. Each fledgling receives a pair of uniquely numbered vinyl (Gallagher Tent & Awning, 809 Plaenert Dr., Madison, Wisconsin 53713, USA) patagial tags, using similar pattern size and application techniques to those used for California Condors *Gymnogyps californianus* (Wallace *et al.* 1980). In 2005

we used yellow vinyl with black numbers, but switched to white vinyl with black numbers for 2006 and 2007. We switched colours to give birds from Ikh Nart a unique colour, as vultures from other sites in Central Mongolia also receive yellow vinyl wing tags. We calculated minimum dispersal distances by drawing a line between coordinate locations collected with global positioning system (GPS). The positions were imported into ArcGIS 9.2® software and the points connected to determine the distance from the bird's nest site in Ikh Nart to the re-sighting coordinates and the distance between multiple re-sightings. If exact re-sighting coordinates were not available the points were connected to the edge of the province.

### Results and discussion

From 2004 to 2007 we have attached a total of 80 leg bands and 69 of those fledglings also received patagial wing tags (2005 – 2007). We placed wing tags on six vultures in 2005, 37 in 2006, and 26 in 2007. We know that one leg-banded fledgling died in 2007. This bird suffered bilateral wing fractures from an unknown cause, but successfully left the nest in autumn and ground travelled ~12 km before dying. Therefore, 79 leg-banded vultures and 69 wing-tagged vultures (six yellow and 63 white) potentially survived for re-sighting opportunities.

We have received reports of ten sightings (one bird was sighted twice) from nine tagged birds still in Ikh Nart just after

fledgling and prior to migrating out of Mongolia. In all but one instance the birds were feeding on a carcass. In one case seven of the tagged birds were feeding together. Once the birds left Ikh Nart and Mongolia we received 21 sightings of wing tagged birds representing nine individuals (five birds were sighted two to five times) from three countries (18 from South Korea, one from China, and two from Russia) (Table 1). The map in Figure 1 shows the geographic distribution of the re-sightings.

Fledgling sightings represented one bird tagged in 2005, six tagged in 2006 and two tagged in 2007. Nineteen of the re-sightings were during winter (Dec-Mar) in South Korea and China and two re-sightings were in summer (July) in Russia. Mean minimum distance that birds travelled from Ikh Nart to the farthest sighting was  $2152.5 \pm 162.8$  SE km,  $n = 9$ . The shortest minimum distance travelled from Ikh Nart was the bird sighted in China (1078.0 km). This bird was sent to a rehabilitation center to recover from starvation, released several months later, and not re-sighted since its release. The longest minimum distance travelled by a bird from the nest was an individual sighted in Yakutsk, Russia (minimum distance = 2742.5 km). One bird (White #30) travelled to South Korea (2147.2 km from its nest site), where it was sighted twice (1/7/07 & 1/22/07). It then travelled to Yakutsk in Siberia (2710.5 km from its last sighting in South Korea), where it was sighted on 7/11/07. This bird travelled a minimum of 4905.9 km (straight

line distance between the three sightings) after fledgling, but was captured and placed in the Yakutia Zoo, where it survived only one month. This demonstrates that at least one bird travelled to South Korea in winter and travelled to Russia in summer.

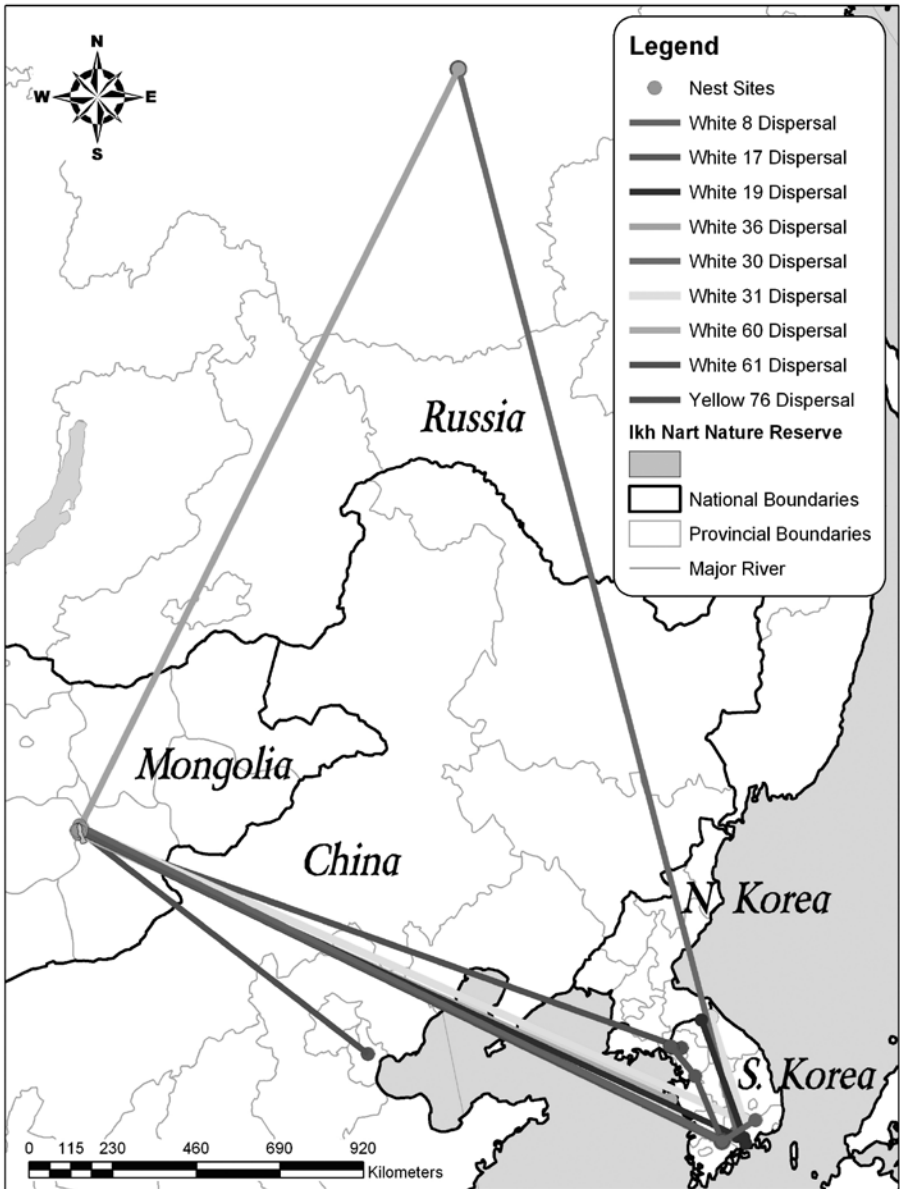
The high number of vulture sightings reported from South Korea may result from the presence of several very visible gathering sites in South Korea, the greater number birding enthusiasts in the country, a greater propensity for birders in South Korea to report their sightings, South Korea representing the predominant dispersal pattern for Ikh Nart vultures, or some combination of these factors. More birds may be travelling to Siberia in Russia, but the remoteness of the region and fewer observers may account for the paucity of re-sightings when compared to South Korea.

In March 2008 we sighted two wing-tagged vultures back in Ikh Nart. One vulture had a yellow tag (2005 fledgling?) and a white tag (2006 or 07 fledgling). Unfortunately we could not read the numbers. Since yellow tags are used for fledgling vultures in other parts of Mongolia, this individual may not have originated in Ikh Nart; however, as far as we know, white tags are only used in Ikh Nart. Both birds were associated with several other vultures. A third tagged vulture (white #46 – a 2007 fledgling) was sighted in July 2008 ~110 km from the reserve. This animal was feeding with several vultures near a sheep abattoir. Since our tagged birds could only be one to two years old, they are too young

Table 1. Re-sightings of Eurasian Black Vultures *Aegypius monachus* that fledged from Ikh Nart Nature Reserve, Mongolia (NR = no data recorded).

| Wing tag # | Leg band # | Date marked | Re-sighting Date    | Re-sighting Location    | Re-sighting Country | Distance between re-sightings |
|------------|------------|-------------|---------------------|-------------------------|---------------------|-------------------------------|
| White 17   | 236        | 7/20/06     | Nest to 12/16/06    | N36.97317<br>E127.21628 | S. Korea            | 2058.4 km                     |
| White 17   | 236        | 7/20/06     | 12/106 to 1/28/07   | NR                      | S. Korea            | NR                            |
| White 17   | 236        | 7/20/06     | 1/28/07 to 12/16/07 | N35.25321<br>E127.43183 | S. Korea            | 269.1 km                      |
| White 17   | 236        | 7/20/06     | 12/16/07 to 3/7/08  | N37.80833<br>E126.78444 | S. Korea            | 100.0 km                      |
| White 31   | 250        | 7/21/06     | 2/19/07             | N38.25000<br>E128.20000 | S. Korea            | 2089.0 km                     |
| White 31   | 250        | 7/21/06     | 2/19/07 to 1/6/08   | N35.58333<br>E128.22222 | S. Korea            | 378.3 km                      |
| White 61   | 291        | 8/4/07      | 1/6/08              | N37.73333<br>E127.06667 | S. Korea            | 2005.5 km                     |
| White 60   | 290        | 8/4/07      | 12/31/07            | N36.58441<br>E126.30201 | S. Korea            | 1985.6 km                     |
| White 8    | 227        | 7/19/06     | 3/21/07             | N35.25321<br>E127.43183 | S. Korea            | 2154.4 km                     |
| White 8    | 227        | 7/19/06     | 2/21/07             | NR                      | S. Korea            | NR                            |
| White 8    | 227        | 7/19/06     | 3/21/07 to 11/24/07 | N35.50025<br>E128.57039 | S. Korea            | 116.6 km                      |
| White 19   | 238        | 7/20/06     | 2/5/07              | N35.02819<br>E128.08708 | S. Korea            | 2226.4 km                     |
| White 19   | 238        | 7/20/06     | 2/5/07 to 2/15/07   | N38.25000<br>E127.91667 | S. Korea            | 27.2 km                       |
| White 19   | 238        | 7/20/06     | 2/15/07 to 2/19/07  | N38.25000<br>E127.91667 | S. Korea            | 0.0 km                        |
| White 19   | 238        | 7/20/06     | 2/19/07 to 2/21/07  | N35.17824<br>E128.08721 | S. Korea            | 322.6 km                      |
| White 19   | 238        | 7/20/06     | 2/21/07 to 2/22/07  | N35.24888<br>E127.92833 | S. Korea            | 307.6 km                      |
| Yellow 76  | 209        | 9/1/05      | 1/14/07             | N39.35000<br>E117.41667 | China               | 1078.0 km                     |
| White 30   | 249        | 7/21/06     | 1/7/07              | N35.30896<br>E127.91337 | S. Korea            | 2147.2 km                     |
| White 30   | 249        | 7/21/06     | 1/7/07 to 1/22/07   | N35.25231<br>E127.43183 | S. Korea            | 48.5 km                       |
| White 30   | 249        | 7/21/06     | 1/22/07 to 7/11/07  | N62.30000<br>E130.40000 | Russia              | 2710.5 km                     |
| White 36   | 255        | 9/2/06      | 7/11/07             | N62.30000<br>E130.40000 | Russia              | 2742.5 km                     |

Figure 1. Map illustrating re-sighting locations of wing-tagged Eurasian Black Vultures *Aegypius monachus*.



to be nesting. Evidence collected to date (July 2008) indicates that birds may travel south from Mongolia to South Korea in the winter and then north back to Mongolia and sometimes as far as Russia in the summer. At this time, we cannot determine whether birds that travel to Russia fly directly from South Korea or typically meander through Mongolia. Adding the three birds re-sighted in Mongolia to the total number of re-sightings improves our re-sighting rate to a re-sighting for every 5.8 birds wing tagged.

In conclusion, wing tagging was a valuable method for marking a large bird such as the Eurasian Black Vulture; it provided us with a relatively high rate of re-sightings. We had to wing tag approximately six birds at Ikh Nart in order to obtain a re-sighting on a single bird (some birds were sighted multiple times). We have not noted any deleterious effects from patagial tagging. We plan to continue our patagial marking and hope additional sightings will

help to elucidate the dispersal and possible migratory patterns for Eurasian Black Vultures originating from Ikh Nart.

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