Report of the Independent Bird Survey, Bijarim Ro, Jeju, June 2019

Nial Moores, Birds Korea, June 24th 2019

Photo 1. Black Paradise Flycatcher, Bijarim Ro, June 2019 © Ha Jungmoon

새와 생명의 터
BIRDS KOREA

1. Survey Key Findings

In the context of national obligations to the Convention on Biological Diversity; and in the recognition of the poor quality of the original assessment in June 2014 which found only 16 bird species in total and concluded that the proposed road-widening would cause an "insignificant" impact to wildlife and no impact to Endangered species (because there are no Endangered animal species in the area), this independent bird survey conducted on June 10th and 11th and again from June 14th-19th 2019 concludes that forested habitat along the Bijarim Ro is of high national and probably of high international value to avian biodiversity conservation. Although this survey was limited in time and scope (so that the populations of many species were likely under-recorded), and very little time was available to conduct additional research for this report and for translation (five days total), our survey findings include:

(1) 46 species of bird in total, including six species of national conservation concern;
(2) 13 territories of the nationally Endangered Fairy Pitta *Pitta nympha* and 23 territories of the nationally Endangered Black Paradise Flycatcher *Terpsiphone atrocaudata* within 500m of the Bijarim Ro, with several of these territories within 50m of the road;
(3) Three territories of the nationally and globally Endangered Japanese Night Heron *Gorsachius goisagi*, at least two of which were within 500m of the Bijarim Ro. The Japanese Night Heron has a world population of only 600-1700 individuals, and has been proven to breed only two times previously in the Republic of Korea;
(4) Based on literature review and consultation with overseas experts on the Japanese Night Heron and Fairy Pitta, road-widening along the Bijarim Ro and clearing of vegetation for path creation in forest close to the road will in all probability result in a reduction in the local population of these threatened species; and contribute to their ongoing global declines.

Acknowledgements. With thanks to Jeju Docheong, Mr Ahn Jae Hong and Kim Sun-Ae for the invitation to survey and for funding support; to Kim Kimi for essential support throughout the survey (including noting GPS locations); to Ha Jungmoon for recordings and for support with translation; Ju Yong-Ki for survey support; Park Meena, National Coordinator of Birds Korea for logistical support and leading the translation and editing; and Dr Kawakami Kazuto and Dr Lin Ruey-Shing for their expert advice on Japanese Night Heron and Fairy Pitta.

Bird nomenclature and order throughout follows Moores et al. (2018), and is based on the World Checklist maintained for the International Ornithological Congress by Gill & Donsker (2018 and versions thereof).

Citation: Moores, N. 2019. *Report of the Independent Bird Survey, Bijarim Ro, Jeju, June 2019*. Produced by Birds Korea, Busan, Republic of Korea.

2. Survey Dates, Times and Methods

(1) For the reassessment, Jeju Docheong defined the "Survey Area" as all habitats within 500m of the proposed 2.94km long stretch of the Bijarim Ro road that has been targeted for widening (Fig. 1). This is an area of approximately 300ha.

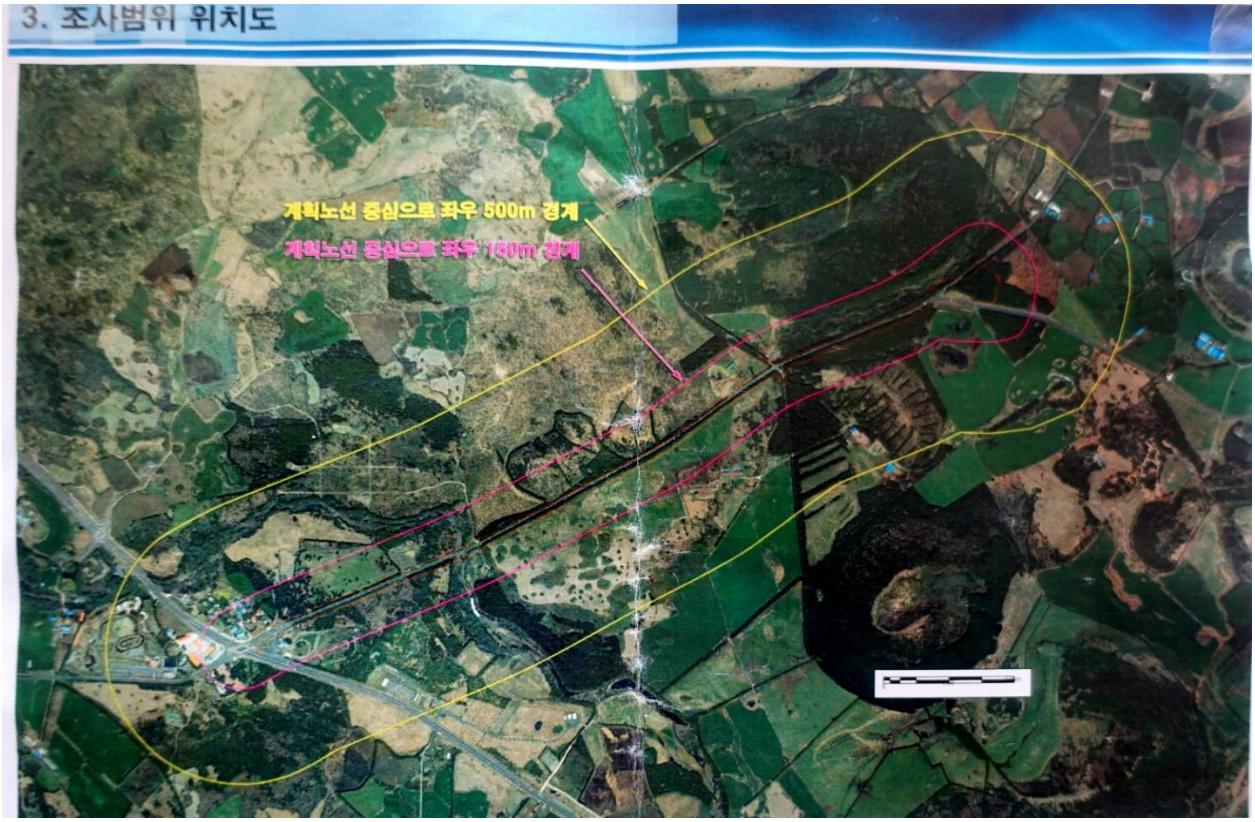

Fig 1. Bijarim Ro Bird Survey Area (from material provided by Jeju Docheong on June 10th). Yellow line indicates 500m outer boundary of survey area.

(2) The Survey Area therefore contains forest; grazing land for horses; arable land; grassland; orchards; one village; the Bijarim Ro and several connecting roads.

(3) Because mid-June is the peak of breeding activity for several forest species, including the Nationally Endangered Fairy Pitta (Kim et al. 2012) and Nationally Endangered Black Paradise Flycatcher (Choi et al. 2017), it was assumed - based on a review of relevant literature (e.g. Slagsvold 1977; Kawakami & Fujita 2005; Marchant et al. 2009; Lin et al. 2011; BSG Ecology. 2015) and decades of survey experience - that almost all birds would be holding active territory, i.e. if birds of a certain species were heard or calling singing persistently, then most likely both a male and a female of that species would be present, with

e.g. either the male singing and the female sitting on eggs; or the male and female both feeding young.

(4) It was decided not to search actively for nests. Searching for nests can cause much disturbance, and should not be attempted for shy and protected species - because many of the nests can fail if disturbed. Moreover, there is no legal requirement to search for nests when identifying the habitat of Nationally Endangered species.

(5) In the June 10th meeting, it was made clear that repeat surveys in different seasons over several years would be the best way to understand the Survey Area. However, because we needed to complete the survey and report before June 28th, it was agreed that eight days of bird survey would be appropriate. This would allow sufficient time to count birds in most of the Survey Area and to estimate the number of territories of Key Species.

(6) At the meeting, Key Species were agreed to be nationally threatened species and national monuments.

(7) As most species of bird in June are more active and vocal close to dawn and again in the evening (and often silent and secretive in the middle of the day), most of the survey effort was conducted between 4AM and 9AM and again between 4PM and 9PM.

(8) Survey on each date was conducted by Nial Moores. At almost all times, Nial Moores was accompanied by Kim Kimi. On June 10th and 11th, Nial Moores was also accompanied by Ju Yong-Ki; and on June 15th-17th by Ha Jungmoon, a researcher specializing in bird recording and sound analysis. On two dates, we were also joined by a local birdwatcher ("Friend of Life, Kim Yae-Won).

(9) Equipment used included: A tripod-mounted Swarovski telescope; 8x40 Swarovski binoculars; a Sony digital camera; a Sennheiser directional microphone with parabolic dish; and smart phones, for recording sounds and GPS locations (Photo 2).

Photo 2. Recording bird sounds near to the Bijarim Ro

(10) In accordance with breeding bird surveys conducted in other developed nations (for examples see e.g. BSG Ecology 2015; BTO 2019a, BTO 2019b), survey was conducted by walking quietly and slowly along "transects", supported by 5-minute point counts. Every species that was heard or seen was noted by Nial Moores in a notebook (with an approximation of numbers) and the location of almost every individual of Key Species was noted on smart phones with the GPS function.

(11) We did not use playback to help find birds (though we did use it on a total of 1-3 occasions each for Key Species in order to help with documentation); some parts of the Survey Area were not surveyed (e.g. the village in the southwest of the Survey Area); some parts were surveyed only once as they did not appear to contain Key Species; and other areas were surveyed on several dates, in order to try to map out territories so that (a) the number of singing individuals could be refined; and (b) the impacts of various development proposals could be better assessed. This survey therefore likely under-estimated the numbers of birds present in the Survey Area, including Key Species.

Table 1. 2019 Bird Survey Dates and Times within the Bijarim Ro Survey Area

Date	Time AM	Time PM	Hours of Fieldwork	Weather
June 10		13:30-18:20	4 hours 50 minutes	Sunny Periods; rain spots. Mild.
June 11	04:15-10:00		5 hours 45 minutes	Sunny Periods. Windy. Mild
June 14		18:25-21:30	3 hours 5 minutes	Rain, heavy at times. Windy.
June 15	03:30-09:30	19:30-21:15	7 hours 45 minutes	Overcast, becoming sunny. Windy.
June 16	04:30-10:40		6 hours 10 minutes	Sunny periods. Windy. Mild
June 17	04:15-09:00	17:00-21:20	9 hours 5 minutes	Fair. Calm. Mild.
June 18		14:00-19:50	5 hours 50 minutes	Rain showers AM; becoming Sunny periods.
June 19	06:20-10:00		3 hours 40 minutes	Overcast then sunny periods; mild.
Total Time			46 hours 10 minutes	

*Sunrise was at approximately 5:25-5:30 AM

3. Survey Results

In total, the survey found 46 bird species within the Survey Area (i.e. within 500m of the Bijarim Ro).

Of these, 34-38 species are suspected of or confirmed to be breeding within the Survey Area on the basis of one or more of the following: the species was seen in pairs in suitable habitat; the species either "drummed" (White-backed Woodpecker *Dendrocopos leucotos*) or the species called or sung repeatedly; or the species' nest was found; or young (born this year) of the species were seen (Table 2).

Persistent territorial calling and singing, drumming by woodpeckers and the presence of young in the breeding season are widely understood to be evidence of territories and nesting (e.g. Lin et al. 2006; Kawakami 2009; Marchant et al. 2009).

During the present survey, when birds were found singing or giving territorial calls in the same area on more than one date, they were assumed to be the same individuals in territory and were therefore not counted more than once. Their presence was noted, however, allowing a coarse estimate of the number of territories of each species in the Survey Area to be made. For some species recorded only once, no territories were suspected; for some species recorded at only a small number of sites, the estimate is likely to be fairly accurate; for more numerous species (e.g. Brown-eared Bulbul *Hypsipetes amaurotis* and Japanese White-eye *Zosterops japonicus*) the estimates are very imprecise.

Table 2. List of bird species recorded in the Bijarim Ro Survey Area (June 10th-11th, 2019 and June 14th-19th, 2019), with the numbers of individuals and territories and evidence of their breeding.

	Species	Evidence of Breeding [1]	Number Counted, excluding young [2]	Estimated Number of Territories[3]
1	*Mandarin Duck *Aix galericulata*	No	1	?
2	Eastern Spot-billed Duck *Anas zonorhyncha*	Pr	5	1-2
3	Common Pheasant *Phasianus colchius*	Pr, Ts, Ys	25	15+
4	Japanese Night Heron *Gorsachius goisagi*	Pr (?), Ts	4	3
5	Eastern Cattle Egret *Bubulcus coromandus*	No	4	0
6	Grey Heron *Ardea cinerea*	No	1	0
7	Great Egret *Ardea alba*	No	2	0
8	Intermediate Egret *Ardea intermedia*	No	2	0
9	Little Egret *Egretta garzetta*	No	1	0
10	Chinese Sparrowhawk *Accipiter soloensis*	?	1	?
11	Little Ringed Plover *Charadrius dubius*	Ts	1	1?
12	Oriental Turtle Dove *Streptopelia orientalis*	Ts, Ys	25+	20
13	Lesser Cuckoo *Cuculus poliocephalus*	Ts	15+	12
14	Common Cuckoo *Cuculus canorus*	Ts	20	15+
15	Grey Nightjar *Caprimulgus jotaka*	Ts	2	2
16	Pacific Swift *Apus pacificus*	No	30	0
17	Oriental Dollarbird *Eurystomus orientalis*	Ts	1-2	1
18	Common Kingfisher *Alcedo atthis*	?	1	0
19	White-backed Woodpecker *Dendrocopos leucotos*	Ts	5	3+
20	Fairy Pitta *Pitta nympha*	Ts	13+	13
21	Ashy Minivet *Pericrocotus divaricatus*	?	1	1?
22	Tiger Shrike *Lanius tigrinus*	Pr, Ts	2+	2
23	Bull-headed Shrike *Lanius bucephalus*	Pr, Ts, Ys	7	4
24	Black Paradise Flycatcher *Terpsiphone atrocaudata*	Pr, Ts, Ns	26	23+
25	Eurasian Jay *Garrulus glandarius*	?	3	2?
26	Oriental Magpie *Pica serica*	Pr	20+	10+
27	Large-billed Crow *Corvus macrorhynchos*	Pr	7	3
28	Varied Tit *Sittiparus varius*	Ts, Ys	6	4
29	Eastern Great Tit *Parus minor*	Ts, Ys	15	12

30	Brown-eared Bulbul *Hypsipetes amaurotis*	Ts	>150	>50
31	Barn Swallow *Hirundo rustica*	Ts, Ys	5	2?
32	Japanese Bush Warbler *Horornis diphone*	Ts, Ys	40	30
33	Long-tailed Tit *Aegithalos caudatus*	Ts, Ys	8	4
34	Far Eastern Cisticola *Cisticola (jundicis) brunniceps*	Ts	2	2
35	Japanese White-eye *Zosterops japonicus*	Pr,Ts	>150	>50
36	White-cheeked Starling *Spodiopsar cineraceus*	Ys	2	1?
37	White's Thrush *Zoothera aurea*	Ts, Ys	10	7
38	Grey-backed Thrush *Turdus hortulorum*	Ts,Ys	12	10
39	Pale Thrush *Turdus pallidus*	Ts, Ys	25	15
40	Blue-and-white Flycatcher *Cyanoptila cyanomelana*	Ts	2	2
41	Yellow-rumped Flycatcher *Ficedula zanthopygia*	Ts	5	5
42	Eurasian Tree Sparrow *Passer montanus*	Ts, Ys	25	10?
43	Grey Wagtail *Motacilla cinerea*	No	1	0
44	Grey-capped Greenfinch *Chloris sinica*	Ts, Ys	30	3+
45	Meadow Bunting *Emberiza cioides*	Pr, Ts	8	6
46	Yellow-throated Bunting *Emberiza elegans*	Pr, Ts, Ys	10	5

*One photographed by Ju Yong-Ki on morning of June 10th.[1] No (None); Birds seen Paired (Pr); Territorial Sound (Singing/ calling / drumming) (Ts); Nest Seen (Ns); Young seen (Ys). [2] Efforts were made to reduce double-counting, so the "Number Counted" – a sum of counts at multiple sites within the Study Area – is likely to be an underestimate. [3] Estimate of number of territories is based on sight or sound records (and not e.g. habitat availability)

4. Key Species

Six out of the 46 species recorded during the bird survey are Key Species nationally, for biodiversity conservation and / or cultural reasons (Table 3). One additional species, the Jeju-endemic *quelpartensis* subspecies of White-backed Woodpecker, also has cultural value as the symbol bird of Jeju Island

Table 3. Key Species recorded in the Bijarim Ro Survey Area (June 10th-11th 2019 and June 14th-19th, 2019)

	Global Conservation Status[1]	MOE Endangered Species[2]	Biological Science Monument[2]	Cultural History Monument[2]
Mandarin Duck	Least Concern		제327호	
Japanese Night Heron	Endangered	Class 2		
Chinese Sparrowhawk	Least Concern	Class 2		제323-2호
Lesser Cuckoo	Least Concern		제447호	
Fairy Pitta	Vulnerable	Class 2	제204호	
Black Paradise Flycatcher	Near Threatened	Class 2		

1 IUCN, 2019; [2]National Biodiversity Center. 2017. Biodiversity Statistics of Korea 2017.

(1) Mandarin Duck: One male was photographed by Ju Yong-ki on the morning of June 10th.

Mandarin Duck, Bijarim Ro, June 10th, 2019 © Ju Yung-Ki

(2) Japanese Night Heron: Three territories along the Bijarim Ro (Fig. 2: removed for public posting), with an additional bird heard vocalizing (giving their distinctive "wi-HOM" territorial "song") within 1-2km of the road. This "song" is typically given by males, and only rarely by females, and usually is given much less frequently once birds are nesting (Kawakami & Fujita 2005). The first Korean breeding record was in Ara Dong, Jeju City in 2009, with the first eggs hatching on June 22nd (Oh et al. 2010) and at least in parts of Japan, "well-grown broadleaf trees situated within valleys are preferred for nesting" (Ishikawa et al. 2012).

(i) First individual (JNH1) was heard and recorded between 04:30 and 04:55 on June 11th from the Bijarim Ro, at closest probably 50-100m from the Bijarim Ro. JNH1 was heard on several dates (including June 14th and 16th), vocalizing from several different parts of the same forest patch, but was never seen. All of this forest patch is within 500m of the Bijarim Ro.

(ii) At 05:05 on June 11th, a second bird was heard vocalizing (JNH2). JNH2 was heard and / or recorded on several dates (including June 14th, June 15th and 17th), always within c. 100m of the same point. On June 15th, an attempt was made to see whether a nest was visible. Within the forest patch where the bird was heard, one bird was seen very briefly in flight; and another vocalized a minute later from a different direction about 30m from the other bird. The assumption is that this was most likely a breeding pair, near to a nest. At closest this vocalizing bird was c. 560m from the Bijarim Ro. It is not known whether the territory of this pair extends into 500m of the road.

(iii) At 04:25 on June 15th, a harsh "WAAK" call was heard near the stream. The call sounded very similar to an alarm call given by a Japanese Night Heron heard elsewhere in Korea. At 04:52, three "wi-HOM" notes were heard at some distance (within 1km of the stream). On June 17th in very calm conditions, a Japanese Heron was heard vocalizing between 20:15-20:20 in the direction of a patch of forest about 450m from the location of the call heard on June 15th, and is 450m from the Bijarim Ro. Considering the rarity and the habitat requirements of the species it seems reasonable to assume that this is a third territory (JNH3), lying between 50m and 700m from the Bijarim Ro, incorporating stream side habitat (as preferred in Japan: Kawakami 2009) and a more isolated forest patch.

(3) Chinese Sparrowhawk. One, a full adult, was seen in flight low along the stream on June 17th. The species is "unobtrusive" during the breeding season (Global Raptor Information Network 2019). It is therefore unclear whether this bird was in territory or not. Research in the Republic of Korea suggests that even minor habitat change or loss can lead to abandonment of breeding territory (Choi et al. 2012).

(4) Lesser Cuckoo. Widely distributed throughout the Study Area, vocalizing from 04:30AM through until 20:30, with most individuals (12+ singing males) associated with patches of forest.

(5) Fairy Pitta. Apparently confined to "Oreum forest" within the Study Area, where the species is found at high density, with an estimated 13 territories within 500m of the Bijarim Ro, and several additional territories in adjacent forest (Fig 3: removed for public posting).

Photo 3. Fairy Pitta (FP4) Photographed on June 18th 2019 © Nial Moores

(6) Black Paradise Flycatcher: Within 500m of the Bijarim Ro, approximately 23 territories were identified by birds in song, or by paired birds feeding together (Figs.4 & 5: removed for public posting). One nest was found. Additional territories, though at a lower density, were found in adjacent forest between 500m and 1km from the Bijarim Ro. One study (in Taiwan) determined that territory size was c.1ha (Spath et al. 2018); while research in Korea indicates that the distance from streams is the most important environmental factor in habitat selection (Choi et al. 2017).

5. Conservation Issues

(1) As a contracting party to the Convention on Biological Diversity, the Republic of Korea is committed to reducing rates of biodiversity loss. Of particular note, the CBD's Aichi Biodiversity Target 5 calls for, "By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced" and Target 7, "By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity."
(2) Under Republic of Korean legislation relevant to Endangered Species of bird and Environmental Impact Assessments, the term "habitat" is used and there are no references to "nests" (per Attorney at law, Shin Ji-Hyung, June 2019).
(3) The presence of multiple individuals of Japanese Night Heron, Fairy Pitta and Black Paradise Flycatcher in the Study Area clearly identifies forest along the Bijarim Ro as "habitat" of these three species. (The nest of Black Paradise Flycatcher was found within 30m of the Bijarim Ro by

local expert Kang Chang-Wan; and according to a report he shared briefly at a meeting n June 26th, he perhaps also found the nest of Fairy Pitta within 100m of the road).

(4) Based on a review of literature and preliminary communication with specialists, the density of territories of Japanese Night Heron, Fairy Pitta and perhaps Black Paradise Flycatcher in the main forest sections of the Study Area is high. For example, in research conducted in Taiwan, the minimum territory size of the Fairy Pitta was 3ha. The present study suggests that some Fairy Pitta occupied territories smaller than 3ha in the Survey Area. The conclusion reached by Fairy Pitta specialist Dr. Lin Ruey-Shing (in lit., June 12th 2019) was therefore that, "the habitat is extremely good for Fairy Pitta." This is strongly indicative that some areas of the Bijarim Ro Survey Area provide optimal habitat for at least Japanese Night Heron, Fairy Pitta and Black Paradise Flycatcher. In turn, this suggests strongly that it will be very difficult for these same three Nationally Endangered species to relocate to adjacent areas if their habitat is lost – as either the habitat, if optimal, will already be occupied; or, the habitat that is currently unoccupied will be suboptimal for them.

Several further assumptions can also be made based on these survey results.

(5) Japanese Night Heron, Fairy Pitta and Black Paradise Flycatcher very probably occur regularly and annually in the Bijarim Ro Survey Area during the breeding season (May-August). All three are summer visitors to Korea; all three are globally threatened or Near Threatened with global populations suspected to be declining; and there is no indication of a sudden recent increase of the species anywhere within their range. This means that the previous Bijarim Ro road-widening assessment in June 2014 very probably either failed to find these species or did find them and failed to report them.

(6) Although singing Fairy Pitta (4-5) and Black Paradise Flycatcher (six) were also found in territory in the protected 44.8ha Bijarim Forest during survey by Nial Moores on June 16th 2019 between 18:20 and 20:45, their density appeared to be lower than in forest along the Bijarim Ro, and no Japanese Night Heron was heard or seen there. Therefore not all forest in eastern Jeju – even high quality, protected forest - is suitable for Japanese Night Heron.

(7) In published research, the impacts of roads on most species of bird have been shown to be negative (e.g. Benítez-Lópeza et al 2010), with a reduced number and density of most breeding species between 0m and at least 250m from the road; with negative impacts likely greater on ground-nesting species (Polak et al. 2013). The existing road has likely already led to local population declines in all three species; and any further road-widening will likely lead to additional declines in these Nationally Endangered species.

6. Recommendations for Conservation of Key Species along the Bijarim Ro

The main cause of decline associated with roads is likely the increased collision risk with vehicles (Summers et al. 2011) ; with additional negative effects caused by traffic noise; lights; pollution; and

habitat fragmentation, all contributing to increased disturbance to birds and also to a reduction in potential feeding opportunities (e.g. Benítez-López et al 2010). Some published research shows that negative impacts on bird populations caused by roads increase with the width of road, and the quantity and speed of road traffic (e.g. Reijnen et al. 1996; Parris and Schneider 2008; Summers et al. 2011; Johnson et al. 2017).

The Bijarim Ro road cuts through optimal habitat of the ground-nesting / near-ground nesting Fairy Pitta and of Japanese Night Heron and Black Paradise Flycatcher.

Widening of the road will lead to further loss of habitat of these species, and of several other bird species and other threatened non-bird species in the immediate vicinity of the road; and an increase in negative impacts on these species out to probably 250m or more from the road.

The cheapest and most wildlife-friendly option would therefore be to maintain the current road width and to introduce measures to slow traffic on the Bijarim Ro (including e.g. more speed bumps and traffic cameras) and to use signage to educate drivers on the importance of this section of road to nationally- and globally-threatened wildlife.

If traffic flowed more slowly along the road, and drivers were more mindful, then the existing verge could be managed to allow safe pedestrian use; and more parking spaces or safer road exits could be created to help reduce traffic accidents.

If the maximum road speed along 2.9km of the Bijarim Road was 30km/hr, then simple arithmetic suggests that drivers that currently travel along the road at 60km/hr would only suffer an additional travel time of three minutes.

In addition, cutting of trees and clearing of vegetation to create additional walking paths in the forest; and cutting of pine trees and their removal especially during the breeding season (May-August) increases disturbance, will cause some nests or young to be abandoned, and will likely cause reductions in local bird populations (see e.g. RSPB and UK Forestry Authority 1997), especially of Fairy Pitta and Black Paradise Flycatcher. Such management work therefore needs to be delayed until after the breeding season; or cancelled if current populations of Nationally Endangered species are to be maintained along the Bijarim Ro.

7. References

Benítez-López, A., Alkemadea, R. & Verweijb, P.A. 2010. The impacts of roads and other infrastructure on mammal and bird populations: A meta-analysis. *Biological Conservation* 143 (2010) 1307–1316

Bibby, C., Jones, M. & Marsden, S. 2000. *Expedition Field Techniques: Bird Survey*s. Accessed in June 2019 at: http://www.conservationleadershipprogramme.org/media/2014/09/Bird_Surveying_Manual.pdf

BSG Ecology. 2015. Dan's Road Widnes. Breeding Birds Survey Report. Accessed in June 2019 at: https://webapp.halton.gov.uk/PlanningApps/1300379OUT/OTH_Breeding%20Birds%20Survey%20Report.pdf

BTO (British Trust for Ornithology). 2019a. BTO/JNCC/RSPB *Breeding Bird Survey Instructions*. Accessed June 2019: https://www.bto.org/sites/default/files/u16/downloads/forms_instructions/BBS-Instructions-2015-online.pdf_.pdf.

BTO (British Trust for Ornithology). 2019b. *Methodology and Survey Design*. Accessed June 2019: https://www.bto.org/our-science/projects/bbs/research-conservation/methodology

Choi C-Y., Nam H-Y. & Lee W-S. 2012. Territory Size of Breeding Chinese Sparrowhawks (Accipiter soloensis) in Korea. *Korean Journal of Environment and Ecology* Vol.26 No.2 pp.186-191.

Choi S-K., Lim S-J., Park Y-C. 2017. Environmental Factors Affecting Habitat Selection of the Endangered Japanese Paradise Flycatcher (*Terpsiphone atrocaudata*) . *Journal of Agriculture and Life Science*. Accessed in June 2019 at: http://jals.gnu.ac.kr/journal/article.php?code=59138 (in Korean with English abstract).

Gill, F & D Donsker (Eds). 2019. IOC World Bird List (v9.2). doi : 10.14344/IOC.ML.9.2.

Global Raptor Information Network. 2019. Chinese Goshawk Accipter soloensis. Accessed in June 2019 at: http://www.globalraptors.org/grin/SpeciesResults.asp?specID=8156

Johnson C.D, Evans D. and Jones D. 2017. Birds and Roads: Reduced Transit for Smaller Species over Roads within an Urban Environment. *Front. Ecol. Evol*. 5:36.

Kawakami K. 2009. Japanese Night Heron. *Bird Research News*. Vol 6. No. 12. Japan Bird Research Association.

Kawakami K. & Fujita M. 2005. The distribution of the Malayan Night Heron Gorsachius melanolophusin the Yaeyama and Miyako Islands, southern Japan. *Ornithol Sci* 4: 73–79.

Kim E-M., Park C-R., Kang C-W. & Kim S-J. 2012. The nestling diet of Fairy Pitta Pitta nympha on Jeju Island, Korea. *Open Journal of Ecology* Vol.2, No.4, 178-182. Accessed in June 2019: https://www.researchgate.net/publication/276490704_The_nestling_diet_of_fairy_pitta_pitta_nympha_on_Jeju_Island_Korea.

Ishikawa M., Hamaguchi H., Konishi K. Fujita K, Oshika H. & Kawakami K. 2012. The nesting tree and location environment of Japanese Night Heron Gorsachius goisagi in the West Mikawa area of Aichi Prefecture, Japan. *Jpn J Ornithol* 61: 289–295. In Japanese with English language abstract.

Lin CW, Hsu FH, Ding TS. 2011. Applying a territory mapping method to census the breeding bird community composition in a montane forest of Taiwan. *Taiwan J For Sci* 26(3):267-85.

Lin R-S., Lee P-F., Ding T-S. & Lin Y-T.K. 2007. Effectiveness of Playbacks in Censusing the Fairy Pitta (Pitta nympha) during the Breeding Season in Taiwan. *Zoological Studies* 46(2): 242-248

Marchant, J.H., D.G. Noble & S. Haynes. 2009. *A breeding bird survey of The National Forest (English Midlands) in 2008*. Research Report 520. British Trust for Ornithology, Thetford. Accessed in June 2019: https://www.nationalforest.org/sites/default/files/components/downloads/files/Breeding%20Bird%20Survey%20%282.11mb%29.pdf

Moores, N., Ha J-M. & Seo H-M. 2018. The Birds Korea Checklist (2018). Published online by Birds Korea, Busan, Republic of Korea.

Oh H-S., Kim Y-H. & Km N-K. 2010. First breeding record of Japanese Night Heron Gorsachius goisagi in Korea. *Ornithol Sci* 9: 131–134.

Parris, K. M., and Schneider, A. 2008. Impacts of traffic noise and traffic volume on birds of roadside habitats. *Ecology and Society* 14(1): 29. Accessed in June 2019: http://www.ecologyandsociety.org/vol14/iss1/art29/

Polak, M., Wiacek, J,. Kucharczyk, M. & Orzechowsk, R. 2013. The effect of road traffic on a breeding community of woodland birds. *Eur J Forest Res* (2013) 132:931–941.

Reijnen, R., Foppen, R. & Meeuwsen, H. 1996. The effects of traffic on the density of breeding birds in Dutch agricultural landscapes. *Biological Conservation* 75: 255-260

Reijnen, R., Foppen R. & Veenbaas G. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. *Biodiversity and Conservation* 6, 567- 581.

RSPB & UK Forest Authority. 1997. *Forests and Birds. A guide to managing forests for rare birds*. Accessed in June: file:///C:/Users/nmoores/Desktop/Jeju%202019/forests-and-birds.pdf

Slagsvold, T. 1977. Bird song activity in relation to breeding cycle, spring weather and environmental phoenology. *Ornis Scandinavica*. Vol. 8, No. 2 (Nov. 15, 1977), pp. 197-222

Späth, T., M.-L. Bai, L. L. Severinghaus and B. A. Walther 2018. Distribution, habitat, and conservation status of the near-threatened Japanese Paradise-Flycatcher (*Terpsiphone atrocaudata periophthalmica*) on Lanyu, Taiwan. *Avian Conservation and Ecology* 13(1):7.

Summers, P.D., Cunnington, G. M. & Fahrig, L. 2011. Are the negative effects of roads on breeding birds caused by traffic noise? *Journal of Applied Ecology* 2011, 48, 1527–1534.