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Radio Telemetry Simulation for Home Range Predicting of Wreathed Hornbill (*Rhyticeros undulatus*) on Mount Ungaran

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ABSTRACT

Dynamics data of home range and utilization of the Wreathed Hornbill (*Rhyticeros undulatus*) habitat in Mount Ungaran be required. The objective of the study was to determine and simulation the type of transmitter and receiver to be used in the home range area of Wreathed Hornbill in Mount Ungaran Central Java. Time simulation implemented starting in April-August 2015. The step of simulations include identification specification and model of radio transmitter, antennas and receivers type that are used, matching the wave, manufacture coat (jacket) for telemetry and try the ability, endurance telemetry which is attachment on the bird species in the Mangkang zoo. The result of identification specifications and models of radio telemetry were used the product Holohil System Ltd RI-2C transmitter, the active battery 3 (three) years with the 150000-151999 MHz frequency range. Yagi antenna (Yagi Antenna VHF Perdix 151 MHz) used type whip the product of Perdix Wildlife supplies, while the receiver used Yaetsu FT 1802 M/E.

Keyword : Wreathed Hornbill (*Rhyticeros undulatus*), radio telemetry, simulation, home range

INTRODUCTION

Habitat structure and resource availability are important factors that influence bird communities in both naturally occurring and man-made environments (Chiang et al 2012). The conversion of natural habitats to agriculture, plantation, industry, grazing, illegal logging and urbanization causes of declines in bird species.

Wreathed hornbills (*Rhyticeros undulatus*) is the bird species of Bucerotidae family that we can found in Mount Ungaran and using of natural forest for their habitat. The conservation status of Wreathed Hornbill has been category in the Least Concern (LC) (IUCN 2014) and based on CITES (Convention on International Trade of Endangered Species of Wild Fauna and Flora), the status belongs to the second appendix (Soehartono and Mardiasuti 2003). Hornbills species including Wreathed hornbill have a very important role in the Mount Ungaran forest as seed dispersers. Population of Wreathed Hornbill on Mount Ungaran is tendency threatened by habitat loss because of illegal logging, fragmentation, local hunting pressure, and trading of bird species. Previous study showed that the natural forest of Mount Ungaran a suitable habitat for Wreathed hornbill (Rahayuningsih and Nugroho 2013, Rahayuningsih and Nugroho 2015). Existence of Wreathed Hornbill in the habitat will be support the balance of forest ecosystems and must be support by conservation of forest

environment. One of the efforts to provide a foundation of conservation strategy is through the study of ecology and their habitat. However, no empirical studies of Wreathed Hornbills home ranges and habitat use in Mount Ungaran exist. To estimate the home range and habitat use of Wreathed hornbills, we were used radio telemetry method. Radio telemetry is a technique as the transmission of information from a transmitter on a free-ranging wild animal to a receiver. Radio telemetry it possible for determining bird movements over home range in size, breeding area, territories of resident bird species, habitat use, also to the movement patterns of international migratory species. Despite its popularity, radio-telemetry is inappropriate under many circumstances. It is an expensive and time-consuming technique which has proven to be unsuitable for use in some species (Andrusiak et al 1998). In Indonesia Radio telemetry methods have been used on Javan Hawk Eagle, (Afianto et al 1999, Gjerasha et al 2004). We have planning Radio telemetry study for three years (2015-2017) with Wreathed Hornbills as a target species. Before the study begin in Mount Ungaran on Oktober-Desember 2015, we need simulation of the method to ensure which the type of Radio telemetry that we can use. The objective of the study was to determine and simulation the type of transmitter and receiver to be used

in the home range area of Wreathed Hornbill in Mount Ungaran Central Java.

METHOD

The early study for simulation start on April-August 2015. The location for simulation at Semarang state University (SSU), Mangkang Zoo, and Mount Ungaran. First step, we have been done to apply letter permission to arrest Wreathed Hornbills to BKSDA (Balai Konservasi Sumberdaya Alam) Central Java, cooperation with LIPI (Lembaga Ilmu Pengetahuan Indonesia) and IBBS (Indonesia Bird Banding Scheme). The data that we need are : identifying specifications and types of radiotelemetry, antenna and receiver that we used, matching the wave, manufacture coat (jacket) for telemetry, and try ability, endurance telemetry which is mounted on the bird species at Mangkang zoo and Mount Ungaran.

RESULT AND DISCUSSION

To find the transmitter most suitable for Wreathed Hornbill we are looking for some products through internet sites or website, one of which was issued by HSL (Holohill Systems Ltd) "Transmitter". The first step to find the appropriate transmitter which is the body size and weight of the bird. Because the body size and weight of Wreathed Hornbill estimated to be the type of transmitter on raptor, then we search the type of transmitter on raptor group. Conventional transmitters consist of an antenna, a power source and a transmitter unit. The transmitter model for raptor group on HSL are BD2, PD2, R1-2B, R2-2C, R12A, S1-2B, and A1-2B (Table 1 Figure 1). Then we look for the type of transmitter that is more specific and tailored to the purpose of research.

Table 1. Transmitter model for Raptor group (HSL)

Model	Attachment method	Weight (gram)	Life (weeks)	Antenna type
BD2	Backpack/tailmount	0.62-1.95	1-20	Whip
PD2	Backpack/tailmount	2.0-4.0	14-26	Whip
R1-2B	Backpack	5-14	26-100	Whip
R1-2C	Backpack/tailmount	5-21	25-250	Whip
R1-2A	Backpack	10-20	40-100	Whip
S1-2B	Backpack	12-16	26-100	Whip
A1-2B	Backpack	19-13	50-250	Whip



Frequency range : 138 to 235 MHz
 Transmitter : Crystal controlle two stage design, pulse by CMOS multivibrator

pulse widy & Rate: 20 to 24 ms, nominal 0.6 p/s (36 p/m)

Figure 1. R1-2C transmitter model

The result of identification specifications and radio telemetri model from raptor group used is the product from Holohil System Ltd Ri2C transmitter models, with about 10 grams and the active period of the battery is 3 (three) years. We used 6 R1-C2 with the different number (Table 2, Figure 2). This transmitter was designed for tail mount attachment on raptors and other birds with robust tails. It can also be configured for backpack attachment to birds, reptiles and small mammals (HTL).

Table 2. R1-2C Transmitter model for Wreathed Hornbill

Model	Serial number	Freq. (MHz)	Pulse	Attachment Methode	Antena type
RI-2C	201043	150.019	0.63	Backpack,	Whip
RI-2C	201044	150.239	0.63	Backpack	Whip
RI-2C	201045	150.319	0.67	Backpack,	Whip
RI-2C	201046	150.470	0.65	Backpack,	Whip
RI-2C	201047	150.661	0.63	Backpack,	Whip
RI-2C	201048	150.880	0.62	Backpack,	Whip

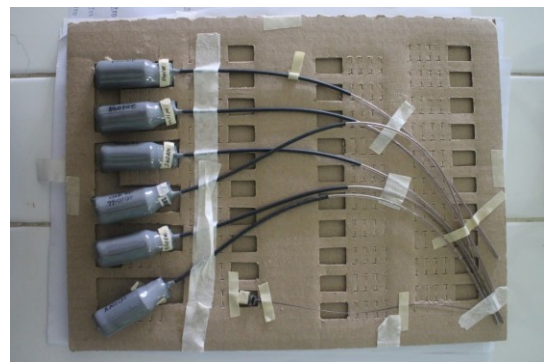


Figure 2 R1-2C transmitter models by HSL with the different number

The antennas type that we used also Whip type, while receivers are used Yaetsu mkll the FT 690 mhz frequency 150000-151999 MHz (Figure 3 and 4).



Figure 3 Antenna Yagi 151 MHz



Figure 4 Radio receiver Yaetsu FT-1802 M/E

The next step was to coordinate the member of team researchers, also with LIPI and RCS (Raptor Conservation Society) to conduct stabilization team through theoretical training and simulation in the Semarang State University area (Fifure 5), Mangkang Zoo, and then directly in the field study on Mount Ungaran.



Figure 5 Simulation radio transmitter in SSU

The training have been done primarily to familiarize team members for distinguish types captured of signal receiver, the other team members are required to recognize individuals who have been given a trial installation of radio transmitter.

Trial installation of the transmitter have been done on Wreathed Hornbill species in Mangkang Zoo. We decide to put the transmitter placed in the backpack of the bird for one week by using the jacket coat (Figure 5 and 6).



Figure 5 To setting radio transmitter on backpack



Figure 6 Radio telemetri backpack attachment method

The test results showed that a transmitter attachment on the backpack has a strong resistance. So that even the birds had several times tried to pull, strong enough transmitter attached and not damaged. After one week simulation, originally a bird disturbed so that it always seeks probe backs and wings to try to take it off, but the next day had not demonstrated such behavior.

The results of trials conducted the wave reception on Mount Ungaran also showed good results, the transmitter can be detected and monitored through a radio receiver that has been configured radio waves.

CONCLUSION

The model and specification radio telemetry are RI-2C transmitters, receivers Yaetsu FT 690 mkl with 150000-151999 mhz frequency and Whip antenna type, can be mounted and used on Wreathed Hornbill Mount Ungaran.

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