

## Distribution of the northern yellow-cheeked gibbon (*Nomascus annamensis*) in Central Vietnam

Nguyen Van Thien<sup>1</sup>, Nguyen Quang Hoa Anh<sup>2</sup>, Van Ngoc Thinh<sup>3</sup>, Le Vu Khoi<sup>4</sup> and Christian Roos<sup>5</sup>

<sup>1</sup> Hue University's College of Education, 32 Le Loi Street, Hue, Vietnam.  
Corresponding author <thientrang83@gmail.com>

<sup>2</sup> WWF - Vietnam, Hue office, 150 Truong Gia Mo Street, Hue, Vietnam.  
<anh.nguyenquanghoa@wwfgreatermekong.org>

<sup>3</sup> WWF- Vietnam, D13 Thanglong Int. Village Cau Giay District, Hanoi, Vietnam.  
<thinh.vanngoc@wwfgreatermekong.org>

<sup>4</sup> Hanoi University of Sciences, Faculty of Biology, 334 Nguyen Trai Street, Hanoi, Vietnam.  
<levukhoi0207@yahoo.com>

<sup>5</sup> German Primate Centre, Gene Bank of Primates and Primate Genetics Laboratory, Leibniz Institute for Primate Research, Kellnerweg 4, 37077 Goettingen, Germany. <CRoos@dpz.eu>

**Key words:** Northern yellow-checked gibbon, vocalisation, distribution

### Summary

The northern yellow-cheeked gibbon (*Nomascus annamensis*) is a species that occurs only in Central Vietnam, southern Laos and northern Cambodia. This species, morphologically similar to the southern yellow-cheeked gibbon (*N. gabriellae*), was recently described by Van Ngoc Thinh et al. (2010) on the basis of genetic and vocal characters. Up to date only a few surveys have been carried out on the species, but information about distribution is essential for its conservation. To obtain further information on the distribution of *N. annamensis*, we recorded gibbon songs in various protected areas, including Bac Huong Hoa Nature Reserve (NR) and Dakrong NR in Quang Tri Province, Phong Dien NR, Bach Ma National Park (NP) and Hue Saola NR in Thua Thien Hue Province, Song Thanh NR in Quang Nam Province, Chu Mom Ray NP in Kon Tum Province and Kon Ka Kinh NP in Gia Lai Province. In total, 171 individuals (73 males, 98 females) in 71 groups were recorded and analyzed in comparison with recordings of *N. siki* and *N. gabriellae*. The data confirm the presence of *N. annamensis* in eight protected areas in central Vietnam: Bac Huong Hoa NR (10 groups), Dakrong NR (7 groups), Phong Dien NR (10 groups), Bach Ma NP (13 groups), Hue Saola NR (8 groups), Song Thanh NR (2 groups), Chu Mom Ray NP (14 groups) and Kon Ka Kinh NP (7 groups).

## Sự phân bố của vượn đen má hung trung bộ (*Nomascus annamensis*) tại miền trung Việt Nam

### Tóm tắt

Vượn đen má hung trung bộ (*Nomascus annamensis*) là loài đặc hữu của Việt Nam, Lào, Campuchia. Loài này có hình thái tương tự vượn đen má vàng (*N. gabriellae*) được phát hiện bởi Van Ngoc Thinh và et al năm 2010 trên cơ sở phân tích di truyền và tiếng hót. Cho đến nay chỉ có một số ít cuộc điều tra về loài được tiến hành, nhưng thông tin về sự phân bố là rất cần thiết cho bảo tồn chúng. Để có thêm thông tin về sự phân bố của (*N. annamensis*), chúng tôi tiến hành ghi nhận bài hát vượn trong khu vực bảo vệ khác nhau bao gồm: Khu bảo tồn thiên nhiên (KBTTN) Bắc Hương Hóa và Đakrông, tỉnh Quảng Trị; KBTTN Phong Điền, Vườn quốc gia (VQG) Bạch Mã, KBTTN Sao La Thừa Thiên Huế, tỉnh Thừa Thiên Huế; KBTTN Sông Thanh, tỉnh Quảng Nam; VQG Chu Mom Ray, tỉnh Kon Tum; VQG Kon Ka Kinh tỉnh Gia Lai. Kết quả khảo sát tại trung bộ, Việt Nam đã ghi nhận được 171 cá thể trưởng thành (73 đực, 98 cái) trong 71 đàn đã được ghi nhận và phân tích so sánh với các bản ghi âm của *N. siki* và *N. gabriellae*. Các dữ liệu xác nhận sự hiện diện của *N. annamensis* trong tám khu bảo tồn ở Trung Bộ Việt Nam: KBTTN Bắc Hương Hóa (10 đàn), KBTTN Đakrông (7 đàn), KBTTN Phong Điền (10 đàn), VQG Bạch Mã (13 đàn), Khu bảo tồn Sao La Huế (8 đàn), KBTTN Sông Thanh (2 đàn), VQG Chu Mom Ray (14 đàn) và VQG Kon Ka Kinh (7 đàn).

## Introduction

The Central Annamite mountain range of Vietnam is one of the country's biodiversity hotspots and of worldwide importance identified by WWF 200 global priority ecosystem. The region is habitat for many rare and endemic species including the recently rediscovered for the first time after 15 years saola (*Pseudoryx nghetinhensis*), giant muntjac (*Muntiacus vuquangensis*), Truong Son muntjac (*Muntiacus truongsonensis*), grey-shanked douc langur (*Pygathrix cinerea*), red-shanked douc langur (*Pygathrix nemaeus*), Asian elephant (*Elephas maximus*) as well as the northern yellow-cheeked gibbon (*Nomascus annamensis*).

The northern yellow-cheeked gibbon (Fig. 1) was described as a new species (Van Ngoc Thinh et al. 2010a). Although *N. annamensis* is similar to the southern yellow-cheeked gibbon (*N. gabriellae*) in external appearance, both species clearly differ in their vocalisation and mitochondrial DNA (Konrad & Geissmann 2006; Rawson et al. 2011; Van Ngoc Thinh 2010; Van Ngoc Thinh et al. 2010a; 2010b; 2010c; 2011). Although the general distribution of *N. annamensis* in southern Laos, North Cambodia and Central Vietnam is well known, detailed information about the exact distribution range and occurrence in protected areas, as well as estimates of population sizes are lacking.



**Fig.1.** Left: Southern yellow-cheeked gibbon (*Nomascus gabriellae*); Right: Northern yellow-cheeked gibbon (*Nomascus annamensis*) – males above, females below. The coloration of these species is very similar and the species is not identified in the field. Photos: Tilo Nadler.

Similar to the other crested gibbon species, *N. annamensis* is threatened by illegal hunting, habitat loss due to illegal logging, forest conversion into agricultural land and plantations, and for the construction of roads and hydropower stations.

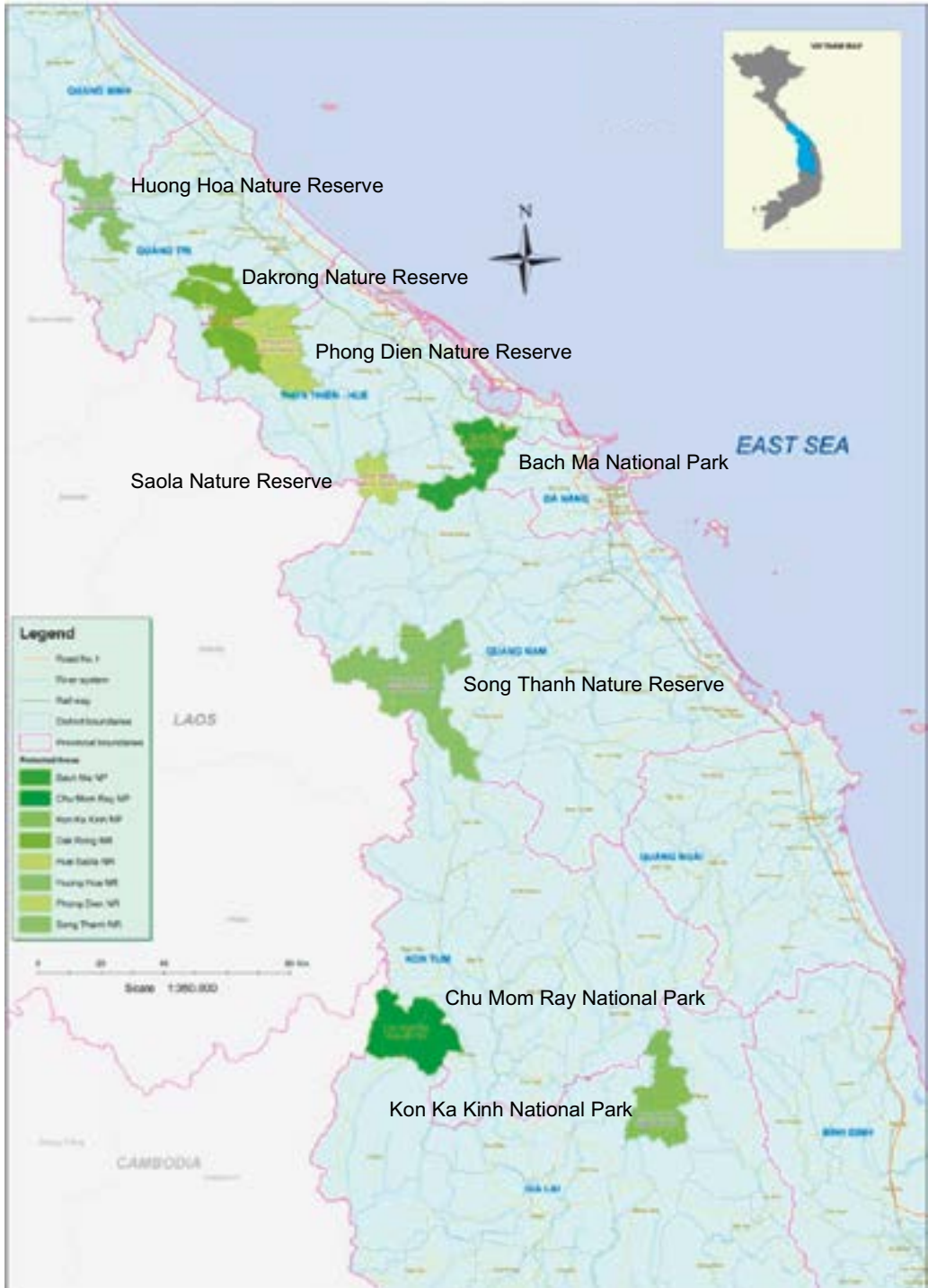
To overcome these limitations, we conducted field surveys in eight protected areas in Central Vietnam and recorded gibbon songs with the aim to confirm the presence of the species and to estimate its population size and group composition.

## Methods

### Survey areas

The herein presented acoustic data is a combination of those collected by Van Ngoc Thinh during a period from 2009 to 2011 (Van Ngoc Thinh 2010) and data newly collected in 2012. In total, eight protected areas were selected as survey areas. These are Huong Hoa NR and Dakrong NR (Quang Tri Province),

Phong Dien NR, Hue Saola NR and Bach Ma NP (Thua Thien Hue Province), Song Thanh NR (Quang Nam Province), Chu Mom Ray NP (Kon Tum Province) and Kon Ka Kinh NP (Gia Lai Province) (Fig. 2).



**Fig.2.** The eight protected areas where surveys conducted.

## Data collection

Before we conducted surveys in the forest, we collected information about the occurrence of *N. annamensis* by interviewing local people and rangers who frequently access the forest. Based on this information, we selected mountain peaks as listening posts, since only on the peak of high mountains; gibbon vocalisation coming from different directions surrounding the area can be recorded. Survey groups recorded gibbon songs at the listening posts from 5:00am to 9:00am. After that, they surveyed along existing trails ("transects") for direct observations of groups or individuals in the surrounding areas until 2:00 to 3:00pm. Surveyors walked slowly on the routes. Noise and smoking were prohibited during transect surveys in order to maximize observations by reducing disturbance. Sometimes, surveyors stopped to listen to gibbon calls or due to gibbon movement. When gibbon songs were heard close by, the surveyors approached quietly to record the voice by a digital recorder, and to verify the exact size and composition of the group.

In eight protected areas, 33 positions were set to perform recording. In average, 2-6 positions were chosen to record. When the gibbon song was listened surrounding the set position, the micro would be turn to the voice source direction to assure that the clearest sound was recorded. In case that two groups of gibbons were singing at the same time and same position, they were recorded one after the other.

While recording gibbon songs, we documented also other information including: position, azimuth, distance (estimated) from sound source to listening position (upon practical experience and measuring on map), recorder, recording date, starting and ending point of gibbon song recorded, song types, group number (depends on song), individual number, sex, age sections also taken note into a form.

## Methods for gibbon song vocal analysis

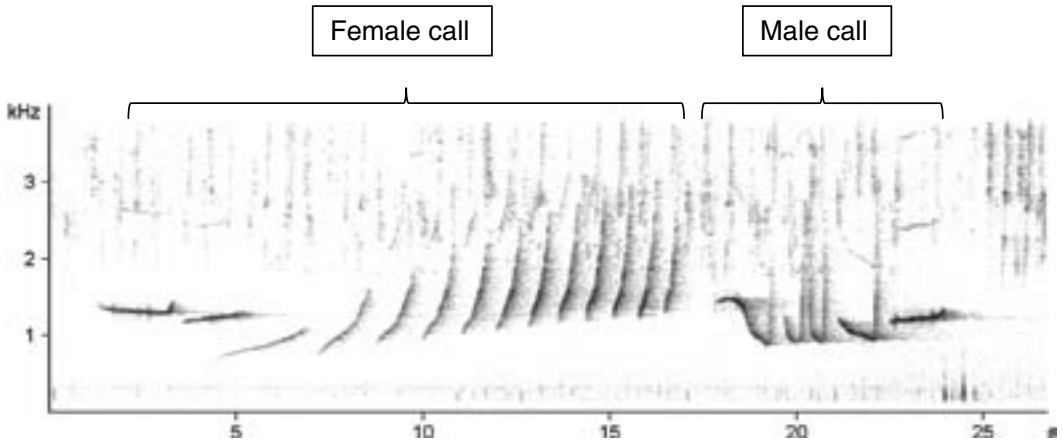
Recorded sound data were analysed by using Avisoft SASLab Pro software. The analytic process was performed as follows:

- Convert sound data file obtained in the field to a typical format as WAV.
- Launching Avisoft – SASLab Pro software.
- Running the program and analysis.

Acoustic analysis of the sound sonograms of northern yellow-cheeked gibbon shows the differences in the vocalization of mature males and females (Fig. 3). The male gibbon song is shorter, more regular and belongs to a band from 1 to 2 kHz, while the female gibbon song is longer, with larger amplitude from 0.5 to 3 kHz. Females produce fast up-down sweeps like a spiral spring, with a vibrato sound on the first two notes. Males produce staccato sounds during, before and after their multi-modulated phrases. All male songs start with almost unmodulated frequency, followed by a down sweep and a fast up sweep. Accordingly, differences in male and female gibbon songs of mature individuals can be easily determined.

## Results

In total 30,853 seconds of gibbon songs were recorded, of which 337 were from gibbon couples and 831 from solo males. At least 171 individuals of northern yellow-cheeked gibbons could be identified - 73 males and 98 females - which leads to an estimation of 71 groups in total at the 8 protected areas (Table 1).



**Fig.3.** Differences between male and female gibbons songs of the northern yellow-cheeked gibbon in a sound spectrogram.

**Table 1.** Summary of the acoustic analysis with information about group size, group composition and duration time of recorded songs in the eight surveyed protected areas.

Locality	Number of					Duration of recorded songs in sec.
	Groups	Duet calls	Male solo calls	Males	Females	
Huong Hoa Nature Reserve	10	47	71	10	16	3,550
Dakrong Nature Reserve	7	41	92	7	8	2,920
Phong Dien Nature Reserve	10	44	127	10	14	2,944
Saola Nature Reserve	8	30	185	8	9	4,669
Bach Ma National Park	13	44	137	15	19	4,046
Song Thanh Nature Reserve	2	5	14	2	3	460
Chu Mom Ray National Park	14	106	122	14	18	7,612
Kon Ka Kinh National Park	7	60	83	7	11	4,652
Total	71	377	831	73	98	30,853

## Acknowledgements

We would like to thank WWF-Vietnam, the Management Board of Bach Ma, Chu Mom Ray and Kon Ka Kinh National Parks, and Huong Hoa, Dakrong, Phong Dien, Hue Saola, and Song Thanh Nature Reserves for their kindly support, providing information and staff to join the survey team. We are also grateful to the staff and rangers of these protected areas for their supports and their participation. In addition, we would like to thank local communities for providing information during the interviews and local guides who supported the survey team during the surveys.

## References

- Konrad R & Geissmann T** (2006): Vocal Diversity and Taxonomy of *Nomascus* in Cambodia. *Int. J. Primatol.* 27, 713-745.
- Nguyen Quang Hoa Anh, Thai Minh Bao, Brook MS & Van Ngoc Thinh** (2010): Report on Distribution Status of White-cheeked Crested Gibbon in Phong Dien-Dakrong NRs, Threats Assessment and Solutions for its Improvement. WWF Greater Mekong Programme, TRAFFIC, FPD & EP, Thua Thien Hue, Vietnam. (Unpubl. Report).
- Rawson BM, Insua-Cao P, Nguyen Manh Ha, Van Ngoc Thinh, Hoang Minh Duc, Mahood S, Geissmann T & Roos C** (2011): The conservation status of gibbons in Vietnam. *Fauna & Flora International and Conservation International*, Hanoi, Vietnam.
- Van Ngoc Thinh** (2010): Phylogeny of Gibbons (Family Hylobatidae) with Focus on Crested Gibbons (Genus *Nomascus*). PhD dissertation, University of Göttingen, Germany.
- Van Ngoc Thinh, Mootnick AR, Vu Ngoc Thanh, Nadler T & Roos C** (2010a): A New Species of Crested Gibbon, from the Central Annamite Mountain Range. *Vietnamese J. Primatol.* Vol. 1(4), 1-12.
- Van Ngoc Thinh, Rawson B, Hallam C, Kenyon M, Nadler T, Walter L & Roos C** (2010b): Phylogeny and Distribution of Crested Gibbons (Genus *Nomascus*) based on Mitochondrial Cytochrome b Gene Sequence Data. *Am. J. Primatol.* 72, 1047-1054.
- Van Ngoc Thinh, Nadler T, Roos C & Hammerschmidt K** (2010c): Taxon-specific Vocal Characteristics of Crested Gibbons (*Nomascus* spp.). In: Nadler T, Rawson BM & Van Ngoc Thinh (eds.): *Conservation of Primates in Indochina*; pp. 121-132. Frankfurt Zoological Society and Conservation International, Hanoi, Vietnam.
- Van Ngoc Thinh, Hallam C, Roos C & Hammerschmidt K** (2011): Concordance between vocal and genetic diversity in crested gibbons. *BMC Evol. Biol.* 11, 36.