"Preliminary acoustic analysis of *Myotis chiloensis* (Waterhouse, 1838), Vespertilionidae, an endemic bat of Southern Temperate Rainforest"

www.fauna-australis.puc.cl

"Ossa Gonzalo*, Ibarra J. Tómas, Hernández Felipe, Gálvez Nicolás, Laker Jerry & Bonacic Cristian. *gossa@uc.cl

Fauna Australis Wildlife Laboratory, School of Agriculture and Forestry Sciences, Pontificia Universidad Católica de Chile

INTRODUCTION:

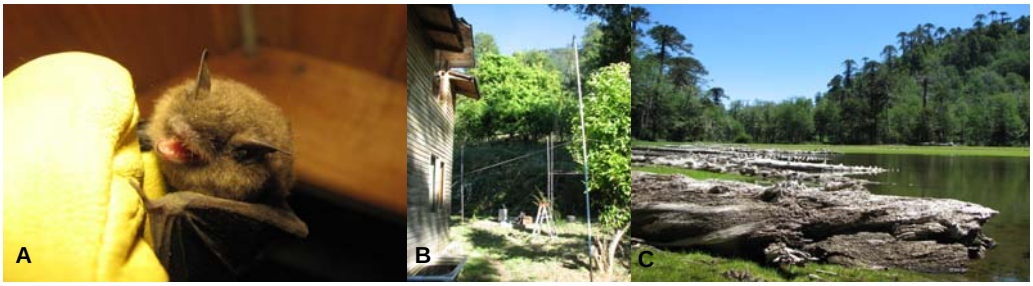
- Bats obtain information for navigation and prey location from characteristics of ultrasound echoes[1].
- Acoustic parameters used are: frequency, amplitude and time delay of the returning echoes. [2,3]
- Three echolocation phases: Search, Approach and Feeding buzz (Fig 1). [2,3,4,5]
- In Chile, 11 species of bats have been described.[6,7,8] Monitoring of echolocation calls has not so far been used.[9]
- *M. chiloensis* is an endemic species of temperate rainforests in Chile and Argentina .[10]

OBJECTIVE:

- Detect and analyze the ultrasound calls emitted by *M. chiloensis* in southern Chile, and to describe the importance of these studies to extend the knowledge about bat ecology.

METHODS:

- Recordings were obtained from male bats, caught in January 2009 using mist nets near Pucón city (39º15'S 71º00'W), Araucanía Region, Chile.
- Mist nets were installed for 5 days at 2m. from the shelter where a colony of male bats was living.
- Echolocation calls were recorded from released bats using the Pettersson D240x ultrasound detector in 10X time expansion mode, connected to an Edirol R-09 digital recorder. Recordings have been analyzed with the Avisoft SASLab Pro 4.51 software, using 22,050 sampling frequency, FFT length 256, Hamming window and Overlap of 75%, following the method published by Barboza *et al*, 2006.



A) Captured M. chiloensis; B) Capture site in Pucón; C) Temperate rainforest, habitat of M. chiloensis.

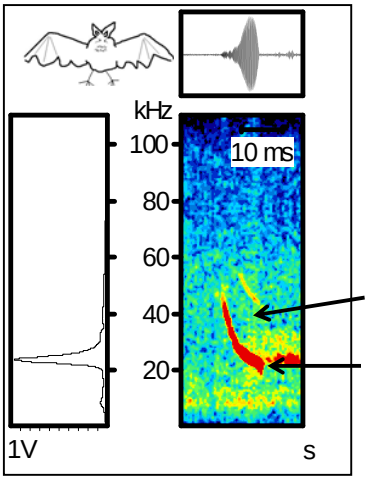


Figure 2: Search phase pulse analysis of M. chiloensis

RESULTS:

- 22 echolocation calls of captured and released individuals and 75 calls of individuals flying near the shelter were recorded.
- The calls of 12 captured and released individuals have been analyzed.
- The search phase pulse analysis showed that the characteristic terminal frequency for this species is **20.8 ± 0.6 kHz**, with a duration of **5.3 ± 2.5 ms** and a pulse interval of **149.9 ± 24.1 ms** (Fig 2).
- The call type is **FM – QCF**, where pulses start with a large narrowband, and then continue with a small frequency variation between the onset and the end of the component.[2,11]

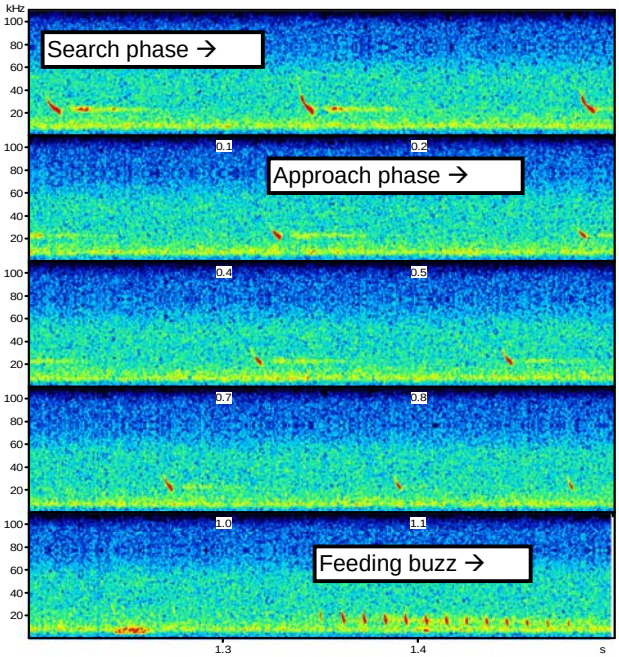


Figure 2: Three echolocation phases of M. chiloensis

DISCUSSION:

- This call type is distinctive for the Vespertilionid family and for edge space aerial foragers[11], like M.chiloensis.
- The first FM component is well suited for accurate target localization.
- The second QCF component is well suited to detect weak echoes from small insects.
- This is the first time that *M. chiloensis* calls have been published, and this work opens up opportunities for future studies better to understand the foraging behavior and habitat use by this species.

ACKNOWLEDGMENTS: Darwin initiative project Ref (15006), Wildlife Trust Alliance, Mr. Miguel & Family, Kathrin Barboza, Luis F. Aguirre and Robert Petitpas.

References: [1]Korine & Kalko 2001, [2]Schnitzler *et al*. 2003, [3]Neuweiler 2000, [4]Siles & Terán 2007, [5]Fenton & Bell 1981, [6]Canals & Cattan 2008, [7]Iriarte 2008, [8]Galaz & Yáñez 2006, [9]Solís 2008, [10]Mann 1978, [11]Schnitzler & Kalko 2001, Barboza *et al*. 2006.

ACTIVITY PATTERNS AND PHENOTYPICAL TRAITS OF *Leopardus guigna* IN THE ARAUCANÍA DISTRICT OF SOUTHERN CHILE

Hernández, F.[1*], Gálvez, N.[1], Laker, J.[1], Macdonald D.W.[2] and Bonacic, C.[1]

[1] Laboratorio Fauna Australis, Facultad de Agronomía e Ingeniería Forestal, Pontificia Universidad Católica de Chile. [2] Wildlife Conservation Research Unit, University of Oxford, U.K.










INTRODUCTION

- The Kodkod or Güiña cat, *Leopardus guigna*, one of the world´s smallest cats, is considered Vulnerable with a declining population trend (IUCN)
- Current knowledge of its ecology and behaviour in Chile is based on just two radio-tracking surveys
- Our study area in the Araucanía district of southern Chile, represents the northern limit of the temperate rainforest in Chile (39º15´S, 71º48´W) (Fig. 1)
- We aim to describe activity patterns and some phenotypical traits of this wildcat in a temperate rainforest fragmented landscape of southern Chile

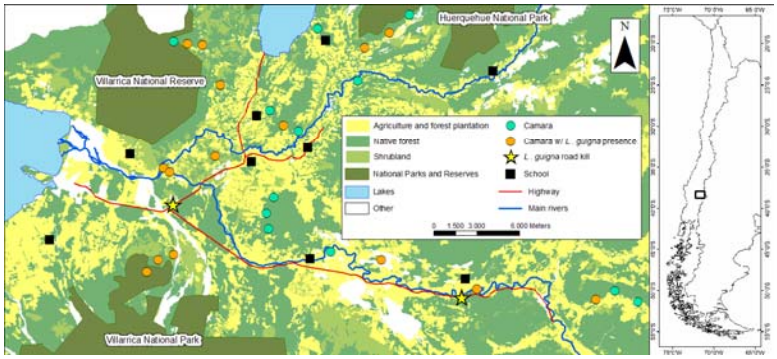


Fig. 1 Study area in the Araucanía region of southern Chile. Occupied sites, main highways, rivers, major land uses, and road kills are shown. Also, schools that participated in environmental education regarding the Kodkod or Güiña cat

METHODS

Pilot studies with camera traps began in 2006. A final design for *L. guigna* was established during 2008/2009, with 27 camera sites (>2km) located in continuous forest (n=18 sites), and forest fragments in the agricultural matrix (<20há; n=9). We obtained *L. guigna* daily activity patterns and frequency of captures along a 30 days-lunar cycle. Also, we estimate *L. guigna* incidence of melanism by independent photo records.

RESULTS

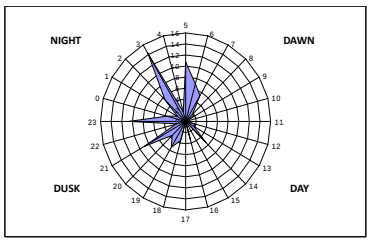


Fig. 2 Daily activity patterns of *Leopardus guigna* in continuous and fragmented forest

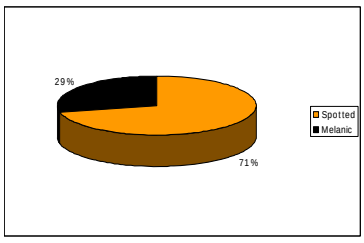


Fig. 3 Proportion of spotted and melanic *Leopardus guigna* photo records

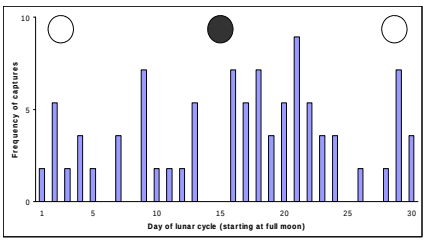


Fig. 4 Frequency of *Leopardus guigna* captures along the lunar cycle. Empty and filled circles show full and new moon phases. 60% of photo records were taken prior, during and after the new moon lunar phase

DISCUSSION

- *L. guigna* strong nocturnal behaviour is in contrast to previous studies, which indicate arrhythmic diurnal activity patterns
- We described an intermediate level of melanism in this felid, compared to other regions of Chile
- Activity levels associated with the new moon lunar phase, suggest a general preference for periods with lower brightness levels
- These results contribute to improve biological knowledge about this endangered native wild cat










Acknowledgements
Darwin Initiative 15/006, Fund for Environmental Protection 2008, National Commission of Environment (CONAMA), Wildlife Trust Alliance, CONAF IX Region y SAG IX Region, Laboratorio Planificación Territorial of the Universidad Católica of Temuco for geografic information. Special thanks to, Isabel Rojas, Robert Petitpas, Omar Ohrens, Tomás Ibarra, Tucker Murphy, Jim Sanderson, Fernando Vidal. Also, all land owners who have permitted our work in their lands. Hernández F. had a CONICYT scholarship.