

RESEARCH ARTICLE

Long-Term Population Survey of the Sulawesi Black Macaques (*Macaca nigra*) at Tangkoko Nature Reserve, North Sulawesi, Indonesia

RANDALL C. KYES^{1,2,3*}, ENTANG ISKANDAR², JANE ONIBALA³, UMAR PAPUTUNGAN³, SYLVIA LAATUNG³, AND FALK HUETTMANN⁴

¹Department of Psychology, Center for Global Field Study, Washington National Primate Research Center, University of Washington, Seattle, Washington

²Primate Research Center, Bogor Agricultural University, Bogor, Indonesia

³Department of Animal Production, Faculty of Animal Sciences, Sam Ratulangi University Manado, North Sulawesi, Indonesia

⁴EWHALE lab, Biology and Wildlife Department, Institute of Arctic Biology, University of Alaska-Fairbanks (UAF), Fairbanks, Alaska

The Sulawesi black macaque (*Macaca nigra*) population at Tangkoko Nature Reserve in North Sulawesi, Indonesia has been the focus of periodic study for over 30 years. The population has shown considerable decline during much of that time. Here we present the results of a long-term population survey of the Tangkoko *M. nigra*, conducted over the past decade, to provide updated information and on-going assessment of the population. Line-transect sampling was conducted annually from 1999 to 2002 and 2005 to 2011 along the same transect during a 2- to 3-week survey period. Although further decline in the population was observed at the outset of the survey, over the subsequent 12-year period we have seen stability in the population parameters with evidence of modest increases in both group and population density. During the 1999–2002 survey periods, there was a mean group density of 3.6 groups/km² and a mean population density of 39.8 individuals/km². During 2005–2011, mean group density increased to 3.8 groups/km² and mean population density was 51.4 individuals/km². The 2011 survey data indicated an estimated group density of 4.3 groups/km² and a population density of 61.5 individuals/km². Given that our transect was located in the core of the Tangkoko reserve, our density estimates should be limited to that area of the reserve. One explanation for the apparent stabilization of the population may be tied to the increasing and sustained number of training and research programs being conducted at the reserve. This collective effort by local and international groups may be helping to reduce illegal activity in the reserve (i.e., hunting and habitat destruction) and generate greater awareness of this critically endangered species. Without the continued vigilance afforded by the existing research and training programs and the support and involvement of the local people, the *M. nigra* at the Tangkoko Nature Reserve will likely face further decline. *Am. J. Primatol.* 00:1–7, 2012. © 2012 Wiley Periodicals, Inc.

Key words: Sulawesi black macaque; *Macaca nigra*; population survey; Indonesia

INTRODUCTION

The Sulawesi black macaque (*Macaca nigra*) population at the Tangkoko Nature Reserve in North Sulawesi, Indonesia has been the focus of periodic study and assessment for over 30 years. Like so many primate populations around the world, the Tangkoko *M. nigra* have suffered the effects of hunting and habitat loss [Lee, 1997; O'Brien & Kinnaird, 1996; Rosenbaum et al., 1998; Sugardjito et al., 1989]. While the decline of many primate populations often goes undetected, the decline in *M. nigra* population at Tangkoko has been well documented. As such, this population has become an important marker in assessing the long-term effects of anthropogenic pressures on the local ecosystem. Continued investigation of this population will provide critical infor-

mation about future population trends and conservation priorities.

Contract grant sponsor: Woodland Park Zoo; Contract grant sponsor: One Earth Institute; Contract grant sponsor: International Primatological Society 2004 Lawrence Jacobsen Education Development Award; Contract grant sponsor: National Center for Research Resources and the Office of Research Infrastructure Programs (ORIP) of the National Institutes of Health; Contract grant number: P51OD010425.

*Correspondence to: Randall C. Kyes, Department of Psychology, University of Washington, Box 351525, Seattle, WA 98195
Fax: (206) 543-7959
E-mail: rkyes@u.washington.edu

Received 20 May 2012; revised 14 September 2012; revision accepted 15 September 2012

DOI 10.1002/ajp.22088

Published online in Wiley Online Library (wileyonlinelibrary.com).