Validating methods to determine walking rates of elephants within a zoological institution

LJ Miller*†, J Andrews‡ and M Anderson†

1 Institute for Conservation Research, San Diego Zoo Global, 15600 San Pasqual Valley Road, Escondido, CA 92027, USA
2 Zoo Operations, Busch Gardens Tampa, 3605 E Bougainvillea Ave, Tampa, FL 33612, USA
* Contact for correspondence and requests for reprints: lmiller@sandiegozoo.org

Abstract

Much controversy surrounds the welfare of elephants within zoological institutions. Among the many concerns are lack of exercise and the prevention of sedentary health and welfare issues due to smaller exhibits in comparison to the home-range sizes for elephants in Africa and Asia. While many scientists have used GPS to examine distances travelled by wild elephants, there is currently little information on distance travelled by elephants within zoological institutions. In the wild, it is necessary to chemically immobilise elephants using a dart gun in order to put on or take off collars which are used to acquire GPS data. Within a zoological institution, elephants can be trained to wear a collar with a GPS device but this training can be time consuming and also dangerous depending on the level of expertise of animal care staff. However, training an elephant within a zoological institution to wear an anklet outfitted with a GPS device can be much safer and less time consuming. The purpose of the current research was to validate methods for examining the walking rates of elephants in a zoological facility. This included testing GPS units, examining walking rates of eight elephants at the San Diego Zoo Safari Park using collars and conducting trials on a subset of elephants wearing both a collar and an anklet outfitted with GPS devices to determine reliability. The average distance travelled by eight African elephants (Loxodonta africana) within a 24-h period was 8.65 (± 0.64) km which corresponds to a rate of 0.360 (± 0.033) kph. Trials comparing anklets to collars were found to be highly reliable except on days when weather conditions were overcast or there was rainfall at the park. The methods used for the current study can be utilised in future studies to examine walking rates as a component of animal welfare for elephants or other large mammals within zoological institutions.

Keywords: activity levels, African elephant, animal management, animal welfare, Loxodonta africana, zoological institution

Introduction

Controversy surrounding the welfare of elephants within zoological institutions has increased in recent years. One concern for zoo biologists is whether or not elephants are active enough to prevent sedentary-related health and welfare issues within zoological institutions. It has been suggested that compromised survivorship in zoos is related to either stress or obesity (Clubb et al 2009). Both factors have been found to decrease the lifespan of humans through a variety of diseases such as coronary heart disease (eg Eckel & Krauss 1998; Kubzansky & Kawachi 2000) and could be a concern for elephants within zoological institutions. Increased activity may be beneficial to zoo elephants, but is yet to be fully explored.

In the wild, research has shown that daily movements by elephants vary considerably based on factors such as distribution of resources and season (Sukumar 2003). In addition, many different methodologies have been utilised to examine distances travelled by wild elephants which make it important to take into account the situations under which distances are measured and the methods used to calculate those distances. Methods which utilise the recording of only one GPS location per day would under-represent the actual distance travelled while utilising focal follows of elephants might be inaccurate leading to over- or under-representation of actual distances travelled. Within zoological institutions, resources are plentiful, so the main factors to consider are seasonal/daily patterns, exhibit size, and the methods and technology to record accurate distances.

Within zoological institutions there has only been one study that examined walking distances of African elephants (Loxodonta africana). Leighty et al (2009) found that seven female African elephants moved at an average rate of 0.409 kph during daytime hours. This rate translated to an average of 3.68 km travelled between 0800 and 1700h. Night-time walking rates were not addressed during this study as elephants were only exhibited outdoors during daytime hours. Clearly, more information is needed on elephants within zoological institutions to determine if distances travelled within these institutions are meeting the activity requirements for elephants in these facilities. The purpose of the current research was to validate methods that allow for the examination of walking rates of elephants in a zoological facility. This included validating the use of anklets with GPS devices as a potentially safer and less time-consuming method for examining walking rates of elephants.