INTRODUCTION

The Barbary macaque (Macaca sylvanus) is an endangered primate species with fragmented populations in Morocco and Algeria. In Morocco, Barbary macaque populations are reported to be decreasing in both the Middle and High Atlas Mountains (El Alami et al. 2013; Menard et al. 2013). In the north of Morocco, reported reasons for the species decline include overgrazing by livestock communally pastured on the mountains, along with habitat fragmentation and destruction for agriculture (Fa 1982; Fa et al. 1984). The topography of the north of Morocco is steep, rocky and, occasionally, inaccessible. The macaques in the region are very wary of people, making them a difficult species to observe (Mehlman 1989).

Two previous surveys of the Barbary macaque populations in the north of Morocco concluded that group sizes were small and the species was in danger of extinction in the region (Fa 1982; Waters et al. 2007). One area included in both these surveys is the mixed oak forest of Bouhachem (Figure 1).

Previously documented group sizes for Bouhachem ranged 8 – 27 individuals in five groups with a mean group size of 13.6 (Fa 1982) and two groups of 7 – 16 individuals, with a mean group size of 11.5 (Waters et al. 2007). As part of a larger investigation into whether the inclusion of local people in a larger survey effort can effectively co-produce information on the status of Barbary macaques in Bouhachem (Waters 2014), we collected group size and composition for four Barbary macaque groups adjacent to one another in Bouhachem forest.

STUDY SITE AND METHODS

The study area, Bouhachem, is in the Tangier-Tétouan region of northern Morocco (Figure 2). Bouhachem is a mountainous forested area of approximately 142km² comprising three species of oak - the evergreen cork oak (Quercus suber), the deciduous zeen oak (Q. canariensis) and Pyrenean oak (Q. pyrenaica). An area encompassing 8,000 ha, constituting about 75% of the total area of forest has protected status as a Site of Biological and Ecological
Interest. At the time of the study there was one paved road through the forest and one track accessible to 4WD vehicles.

Barbary macaques occur throughout the forest but are hard to observe because they flee on encountering people on foot. During the first three months of our study (October – December 2009), we noted that the macaques tolerated a stationary vehicle from a distance of about 30 m. However, if we were on foot, the macaques moved out of sight quickly unless situated on escarpments or rocky outcrops inaccessible to people. We therefore located macaque groups by patrolling the paved road in a vehicle at an average speed of 15 km/h in the morning (7 – 11 am) and late afternoon/evening (3 – 5pm), two days per week.

On encountering a group, we stopped and began to count individuals. Adult males were always the last to flee, so we paid close attention to males during observations of groups whilst in the vehicle and used those with easily observed physical features to identify individual groups. By January 2010, we could confidently identify four macaque groups that contained at least two males that exhibited distinct physical characteristics such as scars or limps that we were able to observe with binoculars from a distance of ~30 m. If no such individual was observed, we recorded the group as unidentified. We recorded one observation per day of each group for two days per week during February and March 2010 (eight weeks).

We recorded macaque group counts and composition when groups crossed an open area such as the paved road, or open clearings. We distinguished four age-sex categories (Table 1). To avoid errors due to the often rapid movement of
individual macaques across open spaces both sub-adult and juvenile age classes are counted together. We do not include newborn infants in this study due to the lack of information regarding infant mortality in this area.

RESULTS

We were able to clearly identify each Barbary macaque group at least eight times during the study and recorded its size and composition. We labelled the groups after the location where we observed them most often.

In Table 2, we present the most comprehensive counts and composition of each group taken during the survey period. Barbary macaque group sizes in this study ranged 52 – 72 individuals with a mean group size of 62. Due to the rapid movement of group members we could not always identify the sex of some adults. The mean overall adult sex ratio was 1:1.1.

DISCUSSION

Preliminary results from this study suggest that current Barbary macaque group size in Bouhachem is larger than those reported in previous surveys by Fa (1982) and Waters et al. (2007) of 7 – 27 individuals. A group in deciduous oak forest in Algeria numbered 53 individuals (Menard & Vallet

<table>
<thead>
<tr>
<th>Date</th>
<th>Study Group Name</th>
<th>Adult Males</th>
<th>Adult Females</th>
<th>Sub-Adults &amp; Juveniles</th>
<th>Unknown Adults</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.3.10</td>
<td>Handak Kherba (HK)</td>
<td>24</td>
<td>16</td>
<td>11</td>
<td>1</td>
<td>52</td>
</tr>
<tr>
<td>28.2.10</td>
<td>Dar de Monte (DM)</td>
<td>17</td>
<td>28</td>
<td>20</td>
<td>7</td>
<td>72</td>
</tr>
<tr>
<td>10.3.10</td>
<td>Marja Ghatwil (MG)</td>
<td>22</td>
<td>25</td>
<td>18</td>
<td>1</td>
<td>66</td>
</tr>
<tr>
<td>13.2.10</td>
<td>Lota Teshta (LT)</td>
<td>18</td>
<td>21</td>
<td>18</td>
<td>2</td>
<td>59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>249</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
suggesting the group sizes we report here may be the norm for this species in such habitat. The previous surveys in Bouhachem took place before the construction of the paved road through the forest and so those group sizes may be lower due to the difficulty in encountering and observing macaques on foot. Low group counts were noted during a study in another area of Barbary macaque habitat in the region and were updated when further opportunities for observation allowed more accurate counts (Mehlman 1984). The ratio of adult males to females concurs with studies of the species in other areas of its distribution (Menard & Vallet 1996).

October has been suggested as the best period for Barbary macaque surveys because macaque activity patterns remain relatively stable allowing easier detection of groups (Menard & Vallet 1997). However, in our experience in Bouhachem, the winter months (December – February) are more conducive to counting non-habituated Barbary macaques in deciduous forest due to less foliage and vegetation which can obscure our view of macaque groups feeding in grassy clearings. These data provide a baseline for a wider survey of the conservation status of Barbary macaques in Bouhachem and provide evidence that Bouhachem may be an important area for the species’ long-term conservation.

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LITERATURE CITED


Waters, S. 2014. Including People in Primate Conservation: A Case Study of Shepherds and Barbary Macaques in Bouhachem forest, North Morocco. Anthropology Department, Durham University. PhD.


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