INTRODUCTION

One of the territories most frequented by the red deer (Cervus elaphus) population of the Tosco-Emilian Apennine Mountains is the Acquerino-Cantagallo Nature Reserve and adjacent areas. These are characterized by forests interrupted by a few clearings for grazing, often encroached by shrubs and invasive species. The red deer are characteristic of the woodland core, where they prefer dense woodland or thicket for cover, resting up in dense cover, moving out to feed in slightly more open habitat, and feeding on patures.

The research was conducted to assess the methods for mitigation of damage to agricultural crops through the investigation of the use of trophic resources by red deer.

MATERIAL AND METHODS

The research was conducted from November 2008 to March 2009 on 12 red deer captured. The type of GPS collars used were Vectronic Aerospace® with GPS, VHF transmitter, sensors for activity, environmental temperature and mortality measures.

The collars were programmed to record positions every hour for 24 hours a day, and to transmit data from the GSM system every 7 fixes. As proposed by Johnson (1988), resource selection was investigated by comparing the composition of habitat types present in the animals’ home ranges with the available composition in the study area (second-order selection), as well as in terms of selection of particular land use categories within the animal’s home range (third-order selection). Overall habitat selection patterns were analysed by compositional analysis where as use and availability of meadows and pastures were compared by the Wilcoxon’s matched pairs test.

RESULTS AND DISCUSSION

The seasonal home range sizes of the 12 hinds were highly variable between individuals ranging from 39 ha to 2809 ha with a median size of 136 ha (Tab. 1). We should note that the precise habitat occupied may of course vary from place to place as climatic conditions change, or as the community itself varies and any one species finds itself living in association with different combinations of other deer. Land use in terms of habitat composition within spring and summer home ranges differed significantly from habitat availability in the study area (compositional analysis, Tab. 2).

<table>
<thead>
<tr>
<th>Animal</th>
<th>Spring</th>
<th>Summer</th>
<th>Autumn</th>
</tr>
</thead>
<tbody>
<tr>
<td>F8</td>
<td>152</td>
<td>120</td>
<td>118</td>
</tr>
<tr>
<td>F12</td>
<td>43</td>
<td>102</td>
<td>135</td>
</tr>
<tr>
<td>F10</td>
<td>86</td>
<td>42</td>
<td>154</td>
</tr>
<tr>
<td>F4</td>
<td>79</td>
<td>55</td>
<td>141</td>
</tr>
<tr>
<td>F6</td>
<td>136</td>
<td>75</td>
<td>368</td>
</tr>
<tr>
<td>F11</td>
<td>124</td>
<td>39</td>
<td>735</td>
</tr>
<tr>
<td>F2</td>
<td>70</td>
<td>79</td>
<td>259</td>
</tr>
<tr>
<td>F5</td>
<td>87</td>
<td>53</td>
<td>207</td>
</tr>
<tr>
<td>F3</td>
<td>83</td>
<td>302</td>
<td></td>
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<td>F7</td>
<td>171</td>
<td>225</td>
<td>279</td>
</tr>
<tr>
<td>F1</td>
<td>664</td>
<td>504</td>
<td>1343</td>
</tr>
<tr>
<td>F9</td>
<td>2809</td>
<td></td>
<td>2358</td>
</tr>
</tbody>
</table>

Table 1: Home range sizes (95% Kernel) of the 12 hinds (F3 deceased in autumn) in spring (25th March – 20th June), summer (25th June – 22nd September) and autumn (23rd September – 20th December).

<table>
<thead>
<tr>
<th>Land use</th>
<th>Study area</th>
<th>Spring</th>
<th>Summer</th>
<th>Autumn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniferous woodland (%)</td>
<td>6.7</td>
<td>5.3</td>
<td>6.1</td>
<td>5.3</td>
</tr>
<tr>
<td>Broadleaves woodland (%)</td>
<td>77.1</td>
<td>71.4</td>
<td>70.6</td>
<td>74.3</td>
</tr>
<tr>
<td>Chestnut woodland and orchards (%)</td>
<td>7.5</td>
<td>6.6</td>
<td>8.8</td>
<td>8.6</td>
</tr>
<tr>
<td>Pastures and meadows (%)</td>
<td>3.4</td>
<td>9.9</td>
<td>7.3</td>
<td>5.5</td>
</tr>
<tr>
<td>Road verges (%)</td>
<td>2.5</td>
<td>3.1</td>
<td>3.1</td>
<td>2.4</td>
</tr>
<tr>
<td>Arable land (%)</td>
<td>1.0</td>
<td>1.5</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Urban areas (%)</td>
<td>1.6</td>
<td>2.2</td>
<td>1.8</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Table 2: Percentage habitat composition in the study area and average habitat composition within seasonal home ranges.

Our results confirm the great value of grasslands resources for red deer and give emphasis to the recovery of abandoned open areas for management purposes, as pastures and meadows are of particular importance in spring when hinds have high energetic demands. Thus, the recovery of abandoned open areas and the opening of new small areas not only meet the forage demands but may reduce damage to agricultural areas and forest regeneration stands.