Abstract. The influence of food abundance and habitat complexity on the feeding habitat selection was studied in a wintering population of common crane at Pedroche Valley (South Spain). Crop lands presented higher amount of acorns along all the study period, while since December, acorns decreased very quickly at the fallow lands. However flocks size found in the crops or in the prairies was similar along all the study period. Flock size in the crop lands seemed not to be influenced by the amount of seed sowed, although flock size increased with acorn abundance in both areas. Crane flock size were not correlated neither by the grass canopy height, nor the floor slope, nor the lowest distance of visibility, but it was positively correlated with the highest distance of visibility. Highest visibility was decreasing along the time suggesting that cranes selected first those areas allowed to conform largest groups.

Key words: Common crane, habitat selection, flock size, predation risk.

Introduction

According with optimal foraging theory, animals may use more extensively those areas offering a higher food quality (Krebs et al, 1983; Stephens & Krebs, 1986). By using the most productive patches, birds may have a high ingestion rate, allowing to reduce the time exposed to predators and having more time to other activities. However, some authors have obtained contradictories results since it was not found a clear relationship between birds abundance and food availability (Pullian & Parker, 1979; Wiens, 1984; Herrera, 1988). If a situation of equilibrium between bird abundance and habitat charge capacity occurs, then must exists an interaction between food availability and habitat complexity, and thus other factors such as predation risk may have a higher influence on birds distribution (Polse, 1982; Wiens, 1984; Pullian & Dunning, 1987; Smith & Shugart, 1987).

Crane species have been shown as species with a high pre-adaptation to respond quickly to habitat changes or food resources (Krapu et al, 1984; Bautista et al, 1992). Common cranes (Grus grus) are very abundant wintering in the pastures of the oaklands of Central West Spain, since their main food resource are the acorns (Fernández-Cruz, 1981; Alonso & Alonso, 1988). However, their spatial distribution is not clearly related with the acorn abundance, since cranes are often more abundant in farmlands where oaks are more sparse. The aim of this paper is to study the influence...
Material and Methods

The study was conducted in the Valle de los Pedroches (North Andalucia), a valley composed of oaklands mainly dedicated to cereal crops and sheep, rotating annually the croplands with the preparation lands (prairies), being the area covered by each type about the same. Because a different history and traditional use of the area, the eastern section of the valley presents stone walls delimiting the farmlands, and a higher density of oaks (40-50 oaks/ha vs 10-20 oaks/ha).

From 11/1-89 to 3-15-90 surveys were realized between 8 to 10 am each two weeks. In each survey it was noted the number of animals conformed each crane flock observed, plotting their position in aerial phonographs (scale 1:5000). For each group, it was determined: 1) the type of habitat (crop or pasture), 2) the estimated slope of the surface (ranged from 1 to 4), 3) the estimated height of the grass, 4) the position respect the oak canopy (beneath or out the oak canopy), and 5) the average distance to the nearest and farthest horizon (by estimating the shorter and longest distance in which cranes may loose both horizons). Additional monthly surveys were carried out to estimate the total abundance of cranes by censusing all the animals resting in the roosts. The surface covered by cranes were calculated by the 95% ellipse technique (McPAAL software).

It was estimated the amount of acorns available each two weeks, by dividing the whole area in 2x2 km quadrants and weighting all the acorns in the proximity of five oaks selected at random. The availability of acorns/ha was obtained by multiplying the average of acorns/oak with the number of oaks in each quadrant by using the mentioned aerial photographs. With this photographs it was estimated the area covered by the oak canopy in each of the 2x2 km² squares. The amount of grains of cereal available in the crops was obtained interviewing the farmers.

To compare the influence of habitat structure on number of cranes, multiple correlation analyses were used. The Ivlev's index of eligibility (Ivlev, 1961) was used to analyze the feeding selection by cranes beneath or outside the oak canopy.
Results and discussion

In the western area of the valley, no crane was detected within any of the crop lands surrounded by stone walls, and thus, all the results correspond to the eastern area of the valley. During sowing time (early November), crops lands were sowed with 97 kg of seed per hectare (SD = 7, n = 27). Since sowing, the height of the grass canopy increased quickly in the crops, while in the fallows the grass height was shorter and showed a s-shaped curve (fig 1). Probably because of the absence of livestock, crop lands presented higher amount of acorns along all the study period, while since December, acorns decreased very quickly at the fallow lands (fig 2). In spite of these differences in food abundance, flocks size found in the crops or in the prairies was similar along all the study period, although flock size changed along all the study period, although since December, cranes avoided these areas, in spite of a higher abundance of acorns. Although during this study is was not detected any predation on cranes, predators (mainly foxes) are very abundant in the area.

Highest visibility were decreasing along the time either in the crops (=0.21, p < 0.05, n = 176) or in the prairies (r = -0.25, p < 0.05, n = 129), suggesting that cranes selected first those areas allowed to conform the largest groups, rather than those where food were abundant, although both variables were involved. In the same way, the presence of wall stones at the eastern areas of the Pedroches' Valley, probably reduce the crane visibility what could be the reason because of cranes avoid these areas, in spite of a higher abundance of acorns.

At the sight of the results, the spatial distribution of cranes was depending on food abundance and habitat structure. Although the food distribution is one of the most important factors influencing the feeding areas selection by birds (Grzybowsky, 1982; Grant & Grant, 1987), habitat structure and complexity, at least these affecting the group size, are modulating this selection.

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