Does tourism affect bird populations in protected areas?

Katja Kangas, Pirkko Siikamäki, Miska Luoto and Antti Ihantola

Abstract — Human induced disturbance can have various impacts on birds. Disturbance has been found to affect for example behaviour, breeding success, species composition and density of birds. Despite of the growing number of disturbance research, little is known about impacts of recreation on forest bird communities as the focus has been mainly on behavioural responses of single species. There is a need for research on tourism-induced changes in bird communities in protected areas, as they are important for many rare and threatened species preferring natural habitats. We studied impacts of tourism on birds in Oulanka National Park, north-eastern Finland. Data on breeding bird pairs were collected with line transect method in hiking trails and in undisturbed control areas. We used general additive models (GAM) to investigate the importance of the tourism-related variables, i.e. visitor numbers in hiking trails and the area of infrastructure, as well as the habitat variables in explaining the variation in bird communities. The preliminary results show that the current tourism pressure has not caused substantial changes in bird communities of Oulanka NP. However, open-cup nesters showed negative response to the number of visitors.

Index Terms — Birds, Disturbance, Protected areas, Tourism

1 Introduction

Popularity of nature-based tourism has been increasing during past few decades. Furthermore, nature-based tourism often concentrates on protected areas like national parks. For example, national parks in northern Finland have nearly tripled their visitor numbers in the past decade [1]. When recreation is directed to protected areas managers are facing the challenge to preserve both conservational and recreational value of the area. Disturbance has been found to affect behaviour, breeding success, species composition and density of birds e.g. [2], [3]. Recreation induced negative impacts can result from direct disturbance, which can cause stress to wildlife, change their behaviour and inhibit them using otherwise important habitat. But recreation can affect also indirectly through modification in the species breeding or feeding environment caused by construction of tourism infrastructure [3]. If the recreational use and construction of infrastructure are intense the populations of original species may decline and new more urban species may benefit and colonize area e.g. [4].

Despite of the growing number of disturbance research, little is known about impacts of recreation on forest bird communities as the focus has been mainly on behavioural responses of species [5]. In Finland, the forests are very intensively used for forest industry and because of the resulting habitat loss and fragmentation of old growth forests populations of many spe-

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cies preferring old forests have declined e.g. [6], [7]. Thus, there is a need for research on tourism-induced changes in bird communities in protected areas, as they are important for many rare and threatened species preferring natural habitats.

We studied impacts of tourism on bird community of Finnish National Park. We used modelling approach (general additive models) to investigate the importance of the tourism-related variables, as well as the habitat variables in explaining the variation in bird communities. It is expected that different bird species (e.g. open nesting species and cavity nesting species) respond differently to disturbance. More specifically we were interested in: Does the tourism related disturbance affect bird density and species composition? And can some bird groups be used as indicators of tourism-induced impacts?

2 METHODS

Study was conducted in Oulanka National Park, north-eastern Finland. Park is situated in boreal forest zone and is mainly covered by coniferous forest, but is also characterized by two river valleys and some mires and lakes. Oulanka National Park is one of the most popular parks in Finland with over 180 000 visitors per year [1].

Bird data were collected with Finnish line transect method in 2006 [8], in June, which is the peak breeding season of birds in the area. Transect lines covered hiking trails with varying visitor pressure but also undisturbed control areas further from tourism infrastructure. Information of visitor numbers in different hiking trails of Oulanka National Park was received from park managers. Some of the most common individual species observed in the area were chosen for statistical analyses. Furthermore, observed bird species were grouped based on their nesting site preference i.e. open nesting species nesting on ground, open nesters nesting on trees or shrubs and cavity nesting species.

Bird transect lines were digitized to the digital map with ArcGIS program and were further divided to 500m long stretches. Around each stretch a 500m wide buffers were created. And from the area of each 500 meter buffer we calculated the proportion of different habitat variables (proportion of dominant tree species, water and wetland area) and tourism related variables (the area of infrastructure and the number of visitors). We also calculated one extra explanatory variable autocovariate [9] to control for spatial non-independence in the data, which could have arisen from grouped observations in the study area. Statistical analyses were performed by using general additive models (GAM).

4 RESULTS AND CONCLUSIONS

In total 3527 observations were made and 62 species were observed during the study. Brambling (*Fringilla montifringilla*) and Willow warbler (*Phylloscopus trochilus*) were the most common passerine bird species and wood sandpiper (*Tringa glareola*) most common wader observed in the Oulanka National Park area. There were no significant differences in observed number of species between hiking trails and control areas. However, the species composition differed between control areas and highly used recreational areas. Some species like wood sandpiper were more common in control areas, whereas, one species redwing (*Turdus iliacus)* showed positive response to number of visitors. From studied bird groups open-cup nesters both nesting on ground and nesting on trees or shrubs were negatively related to number of visitors, whereas visitor pressure did not affect cavity nesting species.

Our results show that the tourism can affect the species density and distribution within the Oulanka national park. The results can be used in planning and managing protected areas. We recommend regular monitoring of bird species in protected

areas in future. Bird group like open-cup nesters nesting on ground could be used as an indicator of sustainable level of recreational use in the area.

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