

Effect of forest structure and disturbance to bird distribution

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1. Introduction

Nopporo forest park, located at the suburban of Sapporo city in Hokkaido, had experienced windthrow disturbance caused by Typhoon in 2004 creating 71ha of gaps in total in the forest. Nature restoration, such as plantation has been implemented in the areas, and the gaps are representing different vegetation structure from surroundings. It is essential to evaluate the changes and the effects to the species composition as the succession of the vegetation proceeds. Therefore, the objectives of this study are to examine the effects to habitat composition and structure on the forest birds, and to evaluate the influences of disturbance on the distribution of birds. In addition, the utilization of forest bird distribution as the possible environmental indicator in the forest park is discussed.

2. Methods

Bird census was conducted by recording the calls in 47 sample points selected randomly. The habitat-environmental relationships were analyzed by using generalized linear models. The independent variables were the presence-absence data of the birds, and the dependent variables were the following two types of environmental factors: 1) site factors were the environmental factors obtained on the sample site in the field, such as the ground cover, the tree stand and the total area of the gaps; 2) scale factors were the data collected from the digitized map within the scale of 50m to 500m in radius, such as the area of the tree stand, the gaps, the water, and the length of the stream, the trail and the gap. The best model fitting was selected by stepwise regression based on Akaike Information Criterion (AIC). The model was evaluated using Receiver Operating Characteristics (ROC).

3. Result and Discussion

27 species of the birds revealed significance to the environmental factors examined. For the site factor variables, 9 and 8 species showed dependency on the ground cover and the tree stand respectively. For the scale factor variables, the birds presented dependency on the 8 types of the environmental variables for different scales, especially 8 of the bird species showed their relationships to the gap presence. Therefore, the result suggested that the forest birds utilized various environmental factors as to the forest structure. Additionally, those birds, which were common in relatively open area, were found in the gaps, while the birds found inner forest tended to avoid the gaps. Consequently, it indicated that the existence of the gap created by windthrow affected on the distribution of the birds in the forest park.

4. Summary

The effects of forest structure and disturbance to bird distribution in the forest park were examined. The birds revealed their dependency on various environmental factors of interest, suggesting that the forest birds are suitable indicator species for showing the processes of forest restoration in the disturbed area. The processes are needed to be monitored for long term. The continuous evaluation should contribute as important conservation criteria to the forest park management.