More stress and lower survival rates for birds in young, managed forests

November 14 2017

Birds experience less stress during the winter months when they shelter in old forests rather than in younger, managed plantations suggests new research. The study in Springer's journal *The Science of Nature* was led by Indrikis Krams of the University of Latvia and the University of Tartu in Estonia.

Forestry activities are increasingly causing the fragmentation and deterioration of old growth forests, and these affect the diversity of plant and animal species. In Northern Europe, for example, a decrease in old, natural forests has been linked to the population decline of many insect-eating forest bird species because their typical wintering and breeding habitats are disrupted. Having enough food to eat and being in good physical condition is crucial if birds are to survive cold spells and snow storms.

Krams' team focused on willow tits (Poecile montanus), a small type of insect-eating bird found widely throughout temperate and subarctic Europe and Northern Asia. During the non-breeding winter periods, willow tits flock together in coniferous trees to feed on arthropods such as insects and spiders. Previous research has shown that the canopies of mature coniferous trees contain more food than younger ones because arthropods prefer older branches that have more needles attached to them.

This study was conducted in south eastern Latvia in young, managed Scots pine plantations between 35 and 55 years old and unmanaged

forests up to 155 years old of mostly Norwegian spruce. The 98 birds from different flocks included in the study were caught twice: once during mild conditions, and again when temperatures were very low. They were weighed and banded, and the researchers evaluated the amount of underskin fat and the condition of their breast muscles. Blood samples were taken immediately after the birds were caught, and then again twenty minutes later to ascertain the effect of being handled. This was done to measure the levels of the stress hormone plasma corticosterone (CORT) in the blood.

The researchers found that the stress hormone levels of birds sheltering in old forests were consistently lower, irrespective of the weather, their age and sex. Follow-up studies indicated that about 92 percent of the tits sheltering in older trees survived the winter, compared to nearly 73 percent that wintered in younger plantations.

"Greater stress levels and lower survival in birds inhabiting young, highly managed and fragmented forests may be due to a lower availability of food resources and a higher risk of predation," explains Krams. "The findings suggest young, managed coniferous forests to be a suboptimal habitat for this species."

These results leave the research team worried about willow tits' future. According to Krams, continuous forests, where these birds are found, have increasingly been turned into managed forests. In addition, small forested patches are usually separated by clear-cuts and young successional forests.

"These changes may result in food shortage for forest dwelling birds, and could explain the dramatic decline of willow tit populations. The Breeding Bird Survey and the Repeat Woodland Bird Survey data show that the willow tit has declined by more than 70% since 1970 and is now a priority species on the UK biodiversity action plan," he says.

More information: Dina Cīrule et al, Habitat quality affects stress responses and survival in a bird wintering under extremely low ambient temperatures, *The Science of Nature* (2017). DOI: 10.1007/s00114-017-1519-8

Provided by Springer