

## Symposium 04 Influence of birds on ecosystem structure and function

### Introduction

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Birds are one of the best studied groups of organisms, receiving much attention because of their interesting morphological and physiological characteristics and their fascinating behavior. Many studies have shown that these traits are adaptations to both the biotic and abiotic environments in which birds live. However, birds are not just influenced by their environment; they themselves influence it, impacting on cohabiting species in ecological communities and on processes operating in ecosystems.

One of the major questions now being addressed in ecology is the influence of biodiversity, i.e. species richness, on ecosystem structure and function (Loreau et al., 2001). Surprisingly, little is known about the effects that birds have on other species in ecological communities and on ecosystem processes. Nor, in this context, has much attention been paid to keystone species, which are those species that have disproportionate impacts on ecosystems (Power and Mills, 1995). Changes in the abundance of keystone species can lead to especially large changes in ecosystem structure and function.

Situations in which birds can have especially marked impacts in ecosystems include: 1, bottom-up control of food webs; 2, top-down control of food webs; 3, flower pollination; and 4, seed dispersal. The role of birds in the bottom-up control of food webs has been shown in a series of excellent studies by Gary Polis and co-workers. They demonstrated that breeding seabirds transport sufficient energy and nutrients from the sea on to land to shape the food webs of whole islands (e.g., Stapp et al., 1999). Top-down control of food webs can act through grazing or predation, birds being particularly important as predators in marine systems (e.g., Wotton, 1992) and on invertebrates in terrestrial ecosystems (e.g., Murakami and Nakano, 2000). Reviews in this symposium highlight other examples. Gilles Gauthier et al. examine the impact of geese as grazers on arctic and temperate wetlands. Sandra Anderson et al. dem-

onstrate that birds play a crucial role as pollinators in New Zealand's terrestrial ecosystems. And Bärbel Bleher and Katrin Böhning-Gaese show that birds can have profound effects on forest regeneration as seed dispersers.

Two further papers, one by Klaus-Michael Exo on balances in predation by shore birds on the benthic community in the Wadden Sea, the other by Charles Brown and Scott Robinson on decision-making in habitat selection and dispersal, were presented as orals only. Abstracts of their papers are published in the Abstract Volume of the Congress.

Several of these studies make the point that a certain species richness of birds is necessary for the successful servicing of ecosystems (Anderson et al.; Bleher and Böhning-Gaese). In some circumstances, moreover, bird species operate alone as keystone taxa (e.g., snow geese *Anser caerulescens*, tui *Prosthemadera novaeseelandiae*, New Zealand bellbird *Anthornis melanura*, and the New Zealand pigeon *Hemiphaga novaeseelandiae*). Conservation and management of such species is necessary not only because of their intrinsic and aesthetic value but also because of the ecosystem services that they provide.

### References

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