

Impacts of sudden winter habitat loss on the body condition and survival of redshank *Tringa totanus*

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Summary

1. Recent theoretical modelling has provided important insights into how habitat loss may affect local populations through impacts on individual fitness (survival, body condition, fecundity). Despite this, attempts to provide empirical evidence of such impacts on displaced individuals have been limited. Using a before-after-control-impact (BACI) approach, we report how a sudden loss of wintering habitat impacted on the body condition and survival of redshank *Tringa totanus*.

2. The intertidal mudflats of Cardiff Bay, UK, were inundated with freshwater in November 1999 following impoundment by a barrage, resulting in the displacement of c. 300 redshank to adjacent habitat on the Severn Estuary. Movements and the survival of these birds were monitored through observations of colour-marked individuals. Comparative survival rates were calculated for marked populations at the main recipient site, Rhymney, and a control site.

3. Displaced redshank had difficulty maintaining their mass in the first winter post-barrage closure: adults previously only recorded at Cardiff Bay were significantly lighter than those previously recorded at Rhymney.

4. Survival rates of displaced redshank also declined. The estimated annual survival of adult Cardiff Bay redshank fell from 0.846 in the 2 years pre-barrage closure to 0.778 in the 3 following years because of a significant decline in winter survival ($P = 0.0006$). In comparison, there was no significant change in the survival of adult Rhymney redshank, and adult survival at the control site was actually greater post-barrage closure than beforehand. The lack of decline in these rates and the similarity between those of Cardiff Bay adults pre-barrage closure and Rhymney adults indicate that the increase in winter mortality of Cardiff Bay birds resulted from their displacement.

5. *Synthesis and applications.* This study provides the first conclusive empirical evidence that habitat loss can impact individual fitness in a bird population. Adult redshank displaced from Cardiff Bay experienced poor body condition and a 44% increase in mortality rate. Without an increase in the recruitment of first-winter birds, such a change is likely to reduce substantially local population size. The results reported here should help to inform governments, planners and non-governmental organizations (NGOs) seeking to understand how developments might impact on animal populations.

Key-words: BACI, body mass, Cardiff Bay, estuarine habitat loss, Severn Estuary, waders, winter mortality

Journal of Applied Ecology (2006) **43**, 464–473
doi: 10.1111/j.1365-2664.2006.01156.x

Introduction

Habitat loss represents one of the major threats to conservation of biodiversity world-wide. On estuaries, large areas of intertidal mudflats and saltmarsh have