

The effect of recreational disturbance on an upland breeding bird, the golden plover *Pluvialis apricaria*

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Abstract

The use of the countryside for recreation has increased dramatically in recent years. This has led to concern amongst conservationists about the effects increased human disturbance may have on important wild animal populations. In the UK, recent legislation has widened the level of access to upland habitats, which support internationally important breeding bird populations. Determining the extent to which recreational disturbance affects upland breeding birds is therefore a conservation priority. We used data collected over 13 years to investigate the impact of recreational disturbance on the distribution and reproductive performance of golden plovers breeding in close proximity to the Pennine Way, an intensively used long-distance footpath. Importantly, the Pennine Way was resurfaced in 1994 to prevent further erosion of the surrounding vegetation. We were therefore able to examine if the response of golden plovers to recreational disturbance was influenced by changes in the intensity and extent of human activity resulting from the resurfacing work. Before the Pennine Way was resurfaced, golden plovers avoided areas within 200 m of the footpath during the chick-rearing period. At this time over 30% of people strayed from the footpath and the movement of people across the moorland was therefore widespread and unpredictable. Following resurfacing, over 96% of walkers remained on the Pennine Way, which significantly reduced the impact of recreational disturbance on golden plover distribution; golden plovers only avoided areas within 50 m of the footpath at this time. Despite the clear behavioural responses of golden plovers to the presence of visitors, there was no detectable impact of disturbance on reproductive performance. In many countries, a conflict arises between the use of the countryside for recreational purposes and the protection of habitats or species of high conservation value. However, this study suggests that the implementation of simple measures to influence visitor behaviour can dramatically reduce the impact of recreational disturbance on wild animal populations.

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1. Introduction

The extent to which the increasing use of the countryside for recreation may have adverse effects on wildlife is a growing conservation issue (Gill et al., 2001b; Papouchis et al., 2001). Animals often respond to humans as they would to potential predators (Frid and Dill, 2002) and responses to human intrusions are well documented for a range of species. These include ele-

vated heart rate (Weimerskirch et al., 2002), increased alarming or defensive behaviours (Andersen et al., 1996; Reby et al., 1999) and ultimately the avoidance of high-risk areas, either completely or by using them for limited periods only (Gill et al., 1996). Disturbance by people can also increase the risk of predation (Anderson, 1988). Consequently, in areas where levels of human activity are high, repeated disturbance by visitors can lead to a reduction in the survival or reproductive success of individuals (Goodrich and Berger, 1994; Burger et al., 1995).

Ground-nesting birds, such as waders (*Charadriidae* spp.), are thought to be particularly at risk from human disturbance. When approached, birds often flush from

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nests, leaving eggs and chicks exposed to possible chilling or predation and imposing an energetic cost on the adults (Nudds and Bryant, 2000; Bolduc and Guillemette, 2003). For example, human disturbance is thought to significantly reduce the chick-rearing ability of African black oystercatchers *Haematopus moquini*, which breed on the coasts of South Africa at the height of the summer tourist season; breeding success outside protected areas was approximately one third of that on reserves (Leseberg et al., 2000). Similarly, human disturbance was found to interrupt incubation and reduce chick foraging time in New Zealand dotterels *Charadrius obscurus* (Lord et al., 1997, 2001). However, other studies have found no evidence of an adverse effect of human disturbance on bird populations (Gill et al., 2001b; Verboven et al., 2001).

In England and Wales, concern regarding the possible detrimental impact of recreational activity on ground-nesting birds has increased following the introduction of the Countryside and Rights of Way (CRoW) Act 2000. The Act creates a statutory right of access on foot for open-air recreation to mountains, moors, heaths, downs and registered common land. Increased access rights are of potential concern in upland areas due to the high numbers of visitors these areas attract (e.g. Peak Park Joint Planning Board, 1988). These upland habitats support internationally important breeding bird populations, including a unique assemblage of breeding waders (Ratcliffe, 1991; Thompson et al., 1995). Under the provisions of the CRoW Act, restrictions can be put in place in areas where new access is likely to jeopardise important breeding bird populations. However, to date, few studies have investigated the impact of recreational activity on upland birds (see Yalden and Yalden, 1989, 1990a) and further research is urgently required to provide reliable information on which to base management decisions.

We investigated the effects of recreational disturbance on the breeding distribution and reproductive performance of golden plovers *Pluvialis apricaria*. Some of the highest recorded breeding densities of golden plover occur on moorlands in Britain (Byrkjedal and Thompson, 1998) and the golden plover is listed under Annex 1 of the EU Wild Birds Directive (79/409/EEC), giving it full legal protection and making this species a priority for conservation. This study was carried out in the Peak District National Park, northern England. The study area is traversed by the Pennine Way long-distance footpath and receives approximately 5000 visitors between April and July (Pearce-Higgins and Yalden, 1997). As a direct result of this intense use, considerable damage had been sustained to sections of the path and the surrounding vegetation (Porter, 1989). In an effort to improve the amenity of the route and to reduce further damage, a 4 km section of the Pennine Way was paved with flagstones during the winter of 1993/1994; access

points were also restricted by the erection of a fence along the edge of the road. This had a significant effect on the behaviour of hikers; over 30% of people strayed from the footpath prior to the resurfacing work compared to just 4% after the flagstones were laid (Pearce-Higgins and Yalden, 1997). This area therefore provided an ideal situation in which to investigate the impact of recreational disturbance on breeding golden plovers, as the amount of human activity varied both spatially and temporally. We tested the hypothesis that golden plovers avoid areas of high disturbance along the footpath and that this is most evident when disturbance levels are highest, at weekends. We also tested the hypothesis that high levels of human disturbance along the Pennine Way result in a lower reproductive performance by pairs with territories nearest to the path. Furthermore, the resurfacing of the footpath, and the associated change in visitor behaviour, enabled us to investigate how different access management options could influence any impact of visitor activity on breeding golden plovers. This study concentrated on the chick-rearing period, as previous research has shown that golden plovers are particularly sensitive to human disturbance at this time (Yalden and Yalden, 1989, 1990a).

2. Methods

2.1. Study site

Data were collected from the Peak District National Park, northern England, between 1986 and 1998. The study site is a 6 km² area of blanket bog to the south of Snake Summit (UK Ordnance Survey Grid Ref: SK088929; Fig. 1), dominated by cotton grass *Eriophorum vaginatum*, with bilberry *Vaccinium myrtillus* and crowberry *Empetrum nigrum* in the drier areas and heather *Calluna vulgaris* on lower slopes. The altitude of the site ranges from 450 to 554 m. As the study site is owned by The National Trust, a UK conservation charity, the land has been designated as “open access” since 1951. Walkers are therefore not restricted to footpaths, although they are encouraged to keep dogs on a lead and to avoid disturbing sheep and ground-nesting birds.

2.2. Survey methodology

Surveys of breeding golden plovers were carried out during the years 1986–1988 and 1996–1998. These were undertaken every 2–8 days during the chick-rearing period (May–July) between 09:00 and 18:00, avoiding days with heavy rain, high winds or poor visibility. A surveyor walked at a steady pace and approached all areas of the study site to within 200 m (Yalden and Yalden, 1990b). The route walked varied between surveys to avoid potential biases in the data by visiting a given area

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