

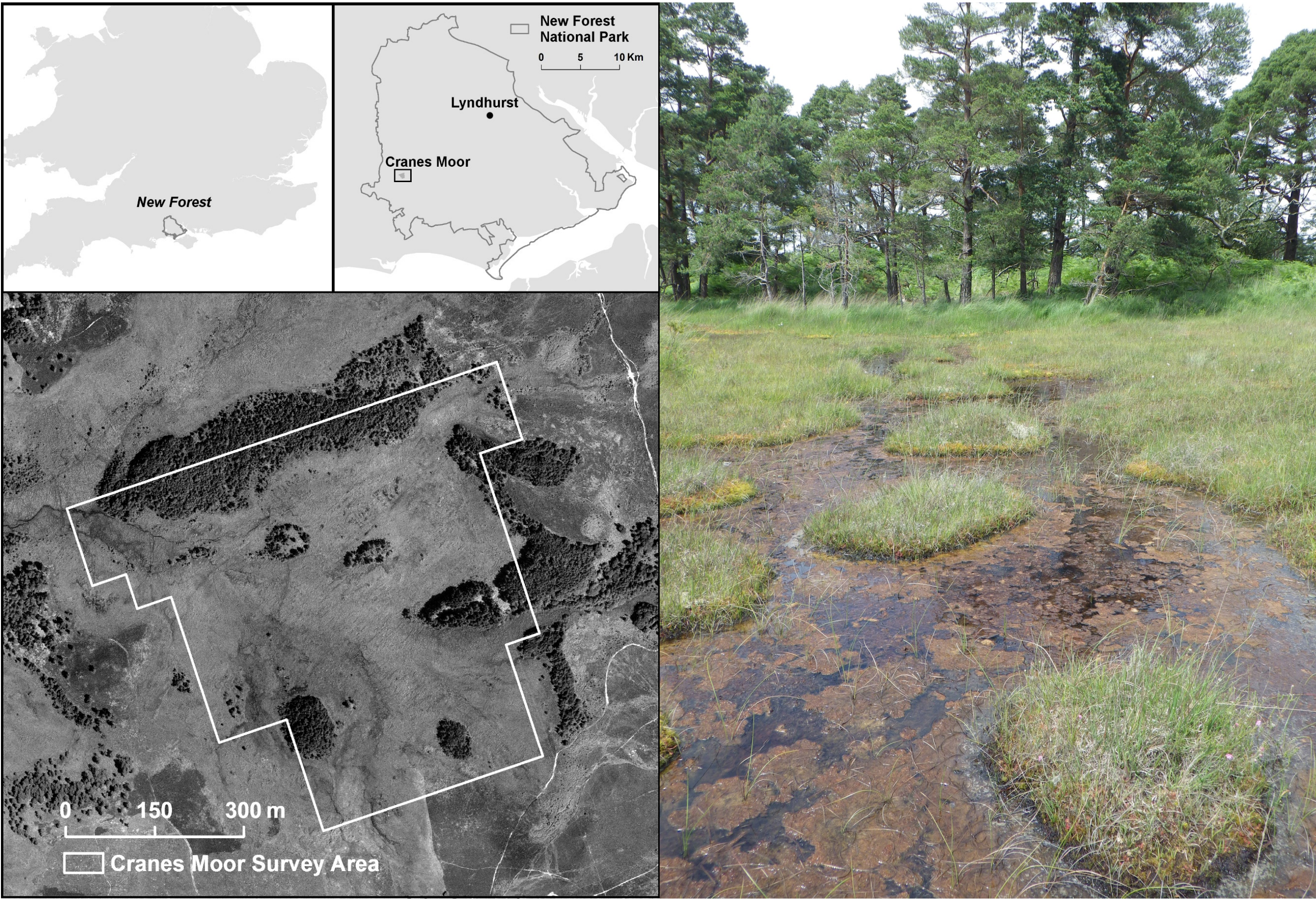
# The Ecology of Cranes Moor

Over 50 years of vegetation change in a peatland environment

## Background

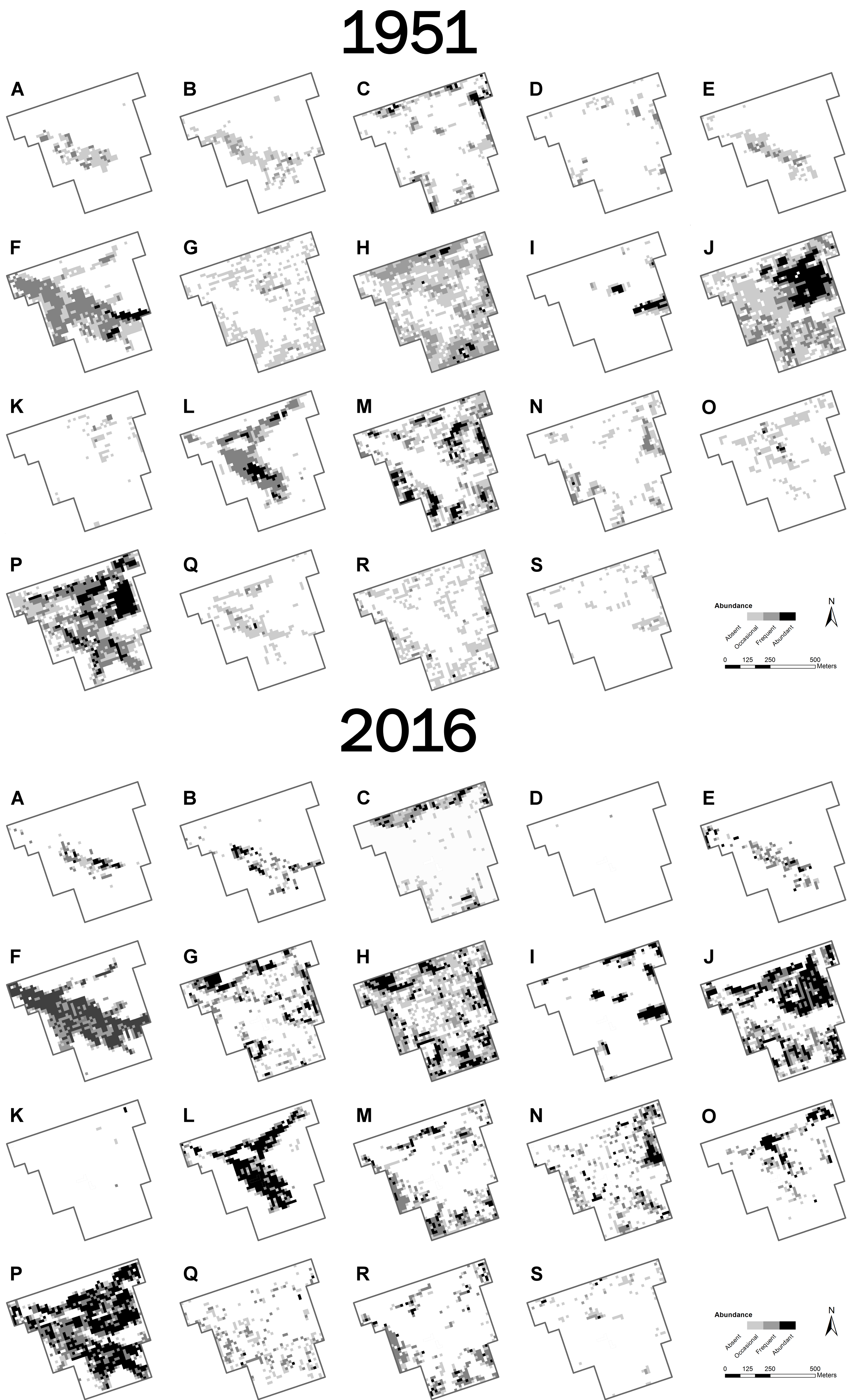
Mires are plant communities of high conservation and societal value, which have experienced a major decline in area in many parts of the world. Evidence suggests that they may be particularly vulnerable to changes in climate and nutrient addition. Although they have been the focus of extensive palaeoecological research, few attempts have been made to examine the dynamics of mire vegetation during the current era of anthropogenic environmental change.

To assess long-term change in the spatial structure and composition of a lowland mire community, we resurveyed plots first surveyed by P. Newbould in 1951 (Journal of Ecology, 48, 361-383) on Cranes Moor, part of one of the largest mire systems in southern England. The survey area was located by using digital scans of maps from the original publication, which were subsequently georeferenced in ArcGIS 10.3. Once the outline of the survey area was referenced, a network of 15 x 15 m grid cells was overlaid onto the map using the fishnet function in ArcGIS to form the basis of a new survey.



**Figure 1** Cranes Moor is located on the western edge of the New Forest National Park (50.824°N, 1.726°W, left, top). The study area mapped by Newbould in 1951 and in this study is shown with an aerial photograph of the bog (left, below). Right, part of Cranes Moor bog showing the diversity of vegetation present.

The vegetation was surveyed during July – August 2016. Grid cells were located in the field using a handheld GPS. Measures of species richness and composition were compared between the two surveys, and changes in community composition were related to plant traits derived from the PLANTATT and BRYOATT databases. We selected the Ellenberg values for N (nitrogen), L (light) and R (pH), and F (moisture) in addition to temperature and precipitation requirements.



**Figure 2** Map showing the abundance of species mapped by Newbould in 1951 (above) and by our study in 2016 (below). A – *Carex rostrata*, B – *Cirsium dissectum*, C – *Erica cinerea*, D – *Lycopodiella inundata*, E – *Menyanthes trifoliata*, F – *Myrica gale*, G – *Pinus sylvestris* (sapling), H – *Pinus sylvestris* (seedling), I – *Pteridium aquilinum*, J – *Rhynchospora alba*, K – *Rhynchospora fusca*, L – *Schoenus nigricans*, M – *Sphagnum compactum*, N – *Sphagnum cuspidatum*, O – *Sphagnum magellanicum*, P – *Sphagnum papillosum*, Q – *Sphagnum subnitens*, R – *Trichophorum germanicum*, S – *Ulex europaeus*.

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## Results & Discussion

Species composition shifted over time (Figure 2, left), associated with a decline in oligotrophic species typical of nutrient-poor bog communities, and an increase in species more tolerant of higher nutrient availability. Significant declines in the area of occupancy were observed in seven species: *Trichophorum germanicum*, *Rhynchospora alba*, *Carex rostrata*, *Cirsium dissectum*, *Sphagnum compactum*, *Rhynchospora fusca* and *Lycopodiella inundata*. Decline in occupancy of the latter two species was >90%. Mean Ellenberg N values were also lower for plants that declined in distribution compared to those that did not. For Ellenberg F (water) indices, declining plants had a higher mean value indicating greater affiliation with water, suggesting that increased incidence of drought may also have been a factor in their decline.

This investigation provides a rare assessment of the dynamics of a mire community over a multi-decadal interval. In recognition of the high societal values of mires, increasing efforts are now being made to restore degraded mire ecosystems in a number of different countries. For such management interventions to be effective, an understanding of how vegetation dynamics influenced by environmental change is required. The investigation provides new evidence of the impact of environmental change on the composition and structure of a lowland mire community, and highlights challenges for their future conservation.



**Figure 3** Scenes from Cranes Moor. Clockwise from top right, bog asphodel *Narthecium ossifragum*, fieldwork underway, marsh orchid *Dactylorhiza* sp., clubmoss *Lycopodiella inundata*, pale butterwort *Pinguicula lusitanica* and a colourful *Sphagnum* carpet.

### Acknowledgements

This work was supported by a Bournemouth University grant to A. Newton and a Higher Education Impact Fund grant to P. Gillingham. The Forestry Commission provided permissions for fieldwork in the study area. L. Davy and A.C.Newton assisted with fieldwork.

